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THE BRITISH PHARMACEUTICAL CODEX 1934

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PREFACE

TO THE

BRITISH PHARMACEUTICAL CODEX, 1934

WITH the object of providing recognised formulæ for medicines which were not official in the British Empire, various supplements to pharmacopœias have been published from time to time, the most notable being Gray's Supplement, which first appeared in 1818, and was subsequently edited by Professor Redwood. More recent works have usefully supplemented the current pharmacopœia by giving particulars of medicinal articles which, although in constant demand, had ceased to receive pharmacopœial recognition. In addition, they have furnished much valuable information concerning the newer materia medica, consisting of substances and preparations which had not yet attained the status of approved and established remedies included in the pharmacopœia.

THE BRITISH PHARMACEUTICAL CODEX, 1907.

The need for a work published by the authority of some statutory body had long been recognised, and by a resolution formally adopted on November 4, 1903, the Council of the Pharmaceutical Society of Great Britain decided to produce such a book of reference for those engaged in the prescribing or dispensing of medicines.

Accordingly, the production of the British Pharmaceutical Codex, 1907, was entrusted to a committee consisting of Mr. Michael Carteighe (*Chairman*), Messrs. C. B. Allen, S. R. Atkins, J. F. Harrington, G. T. W. Newsholme, R. A. Robinson and J. Rymer Young. The labour of compiling the information and conducting investigations was deputed to a sub-committee consisting of Dr. W. E. Dixon, Professor H. G. Greenish, Messrs. E. White, W. F. Gulliver, F. W. Gamble and J. T. Humphrey (*Secretary*), with whom, in the earlier stages of the work, were associated Messrs. H. Wilson and W. Kirkby. The research work required for the solution of problems involved was performed partly in the Pharmaceutical Research Laboratory of the Pharmaceutical Society and a large proportion was undertaken privately by individual members of the Society.

The scope of the book was defined by describing it as an Imperial dispensatory for the use of medical practitioners and pharmacists, since it contained information respecting all drugs and medicines in common use throughout the British Empire. It included also the principal substances and preparations which were official in the Pharmacopœias of France, Germany and the United States, as well as those described in the British Pharmacopœia. The aim of the work was the provision of accurate information for prescribers and dispensers, special attention being given to the requirements of those practising in the British Dominions.

During the four years following the publication of the British Pharmaceutical Codex, 1907, the work was subjected to extensive criticism and discussion, and numerous suggestions and recommendations were submitted to the Pharmaceutical Society with the object of making the book more valuable as a work of reference.

THE BRITISH PHARMACEUTICAL CODEX, 1911.

In January, 1910, the Society's Publications Committee reported to the Council that the preliminary work for the revision of the Codex, which had been conducted by Mr. J. T. Humphrey, was completed. The revision was commenced forthwith by the Codex Revision Committee, consisting of Messrs. C. T. Allen, H. Finnemore, F. W. Gamble, F. Goldby, W. F. Gulliver and E. F. Harrison, with whom were associated Dr. W. E. Dixon, as consulting pharmacologist, and Mr. E. White, representing the Society's Council. Mr. W. J. Uglow Woolcock was appointed Secretary to the Committee and Miss D. M. Braithwaite was appointed to conduct laboratory work in practical pharmacy. Assistance was rendered by members of the Society and of the Society's Staff, and the second British Pharmaceutical Codex was published in October 1911.

The plan of the book was modified in certain respects, the more important changes being (1) the addition of brief descriptive notes on the preparations of each drug and chemical at the end of the respective monographs, (2) the relegation of the working formulæ for all B.P.C. preparations to a separate section of the book, and (3) the inclusion of a pharmacological and therapeutic index, in which all the medicaments were grouped in a single alphabetical list according to their pharmacological action, their general therapeutic use and their application in special ailments. Further, where drugs, chemicals and galenical preparations described in the Codex were official in the British Pharmacopœia or the Pharmacopœia of the United States of America, that fact was indicated.

The appearance of a new British Pharmacopœia in 1914 necessitated the production of a supplement to the 1911 Codex. That supplement was added in 1915. It included some new monographs, galenical formulæ, a series of formulæ for test solutions, and a list of alterations in the text which were necessary to make the book consistent with the new pharmacopœia. This supplement was prepared by the Pharmaceutical Society's Codex Revision Sub-Committee, consisting of Mr. E. White (*Chairman*), Dr. W. E. Dixon, Messrs. F. W. Gamble, W. F. Gulliver, E. F. Harrison, E. T. Neathercoat and H. S. Phillips (*Secretary*), assisted by Mr. J. T. Humphrey and Professors H. G. Greenish and H. L. Smith.

A second supplement, relating to surgical dressings, was added in 1922. It was prepared by the Pharmaceutical Society's Codex Revision Sub-Committee, consisting of Mr. E. White (*Chairman*), Messrs. E. T. Neathercoat, H. Skinner, and F. Browne (*Secretary*), assisted by Messrs. E. A. Andrews, T. Barclay, S. Crabtree,

R. Fouracre, A. D. Gerrard, R. D. Hutchinson, G. A. Mallinson, H. E. Matthews, V. O. Robinson and H. N. Smith.

THE BRITISH PHARMACEUTICAL CODEX, 1923.

In 1921 the revision of the book was undertaken by the Codex Revision Committee, and a new British Pharmaceutical Codex, embodying the supplements of 1915 and 1922, was published in June, 1923. This third Codex was prepared by the Codex Revision Sub-Committee consisting of Mr. E. White (*Chairman*), Dr. W. E. Dixon, Professor H. G. Greenish, Messrs. R. R. Bennett, W. Browne, C. E. Corfield, F. W. Gamble, A. Gunn, C. H. Hampshire, J. Keall, A. R. Melhuish, E. T. Neathercoat, J. Wicliffe Peck, F. Pilkington Sargeant, P. A. W. Self, H. Skinner and F. Browne (*Secretary*). The whole of the text was made concordant with the British Pharmacopœia, 1914, and the United States Pharmacopœia, 9th Revision. A large amount of new matter was inserted relating to medicaments the value of which was thought to be sufficiently established. The general plan of the 1911 Codex was left unaltered, but its chemical nomenclature was brought into line with modern views, and the description of the physiological action of many important substances was extended in accordance with the latest developments of medical research. For the convenience of users, the index was considerably enlarged and numerous additional cross-references were included.

CONSTITUTION OF REVISION COMMITTEES.

During the eleven years which have elapsed since the British Pharmaceutical Codex, 1923, was issued, changes of considerable magnitude in the practice of pharmacy have occurred, and the work has proved itself to be of ever-increasing value as a standard book of reference for pharmacists, medical practitioners and others. The need for a further revision of the whole book to justify the position to which it had risen was recognised by the Council of the Pharmaceutical Society in the formation of the Codex Committee in December 1929, to whom the general supervision and publication of a new British Pharmaceutical Codex was entrusted.

CODEX COMMITTEE.

The Codex Committee has consisted of the following members of the Council of the Pharmaceutical Society:—

H. Skinner, Ph.C., Chairman.

The President of the Pharmaceutical Society (*ex officio*).

The Vice-President of the Pharmaceutical Society (*ex officio*).

F. Gladstone Hines.	E. T. Neathercoat, C.B.E., Ph.C.
*J. T. Humphrey, Ph.C.	L. Moreton Parry.
A. R. Melhuish, Ph.C.	E. Saville Peck, M.A., Ph.C.

With H. N. Linstead, Ph.C., as Secretary.

*Deceased.

On the recommendation of the Codex Committee, the Council appointed C. E. Corfield, B.Sc., F.I.C., Ph.C., to be the Editor of the British Pharmaceutical Codex, and H. Treves Brown, B.Sc., Ph.C., to be the Research Assistant in the Codex Laboratory.

CODEX REVISION COMMITTEE.

The task of revision and preparation was allocated to the Codex Revision Committee, consisting of the following members:—

H. Skinner, Ph.C., Chairman.

G. R. Boyes, B.Sc., F.I.C., Ph.C.
F. W. Gamble, Ph.C.
F. Gladstone Hines.
*J. T. Humphrey, Ph.C.
J. Keall.
A. R. Melhuish, Ph.C.
E. T. Neathercoat, C.B.E., Ph.C.
L. Moreton Parry.
E. Saville Peck, M.A., Ph.C.
P. A. W. Self, B.Sc., F.I.C., Ph.C.
T. E. Wallis, B.Sc., F.I.C., Ph.C., F.L.S.

H. N. Linstead, Ph.C., Secretary.

The general work of revision has been divided into suitable sections and undertaken by the following sub-committees, who have co-operated freely and have submitted their recommendations to the Codex Revision Committee:—

PHARMACEUTICAL CHEMISTRY SUB-COMMITTEE.

P. A. W. Self, B.Sc., F.I.C., Ph.C., Chairman.

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A. D. Powell, A.I.C.
F. L. Pyman, D.Sc., F.R.S.

F. W. Adams, B.Sc., A.I.C., Ph.C., Secretary.

PHARMACOGNOSY SUB-COMMITTEE.

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F. Hemming, Ph.C.
W. O. Howarth, M.Sc.
H. O. Meek, Ph.C.
A. I. Robinson, Ph.C.
P. A. W. Self, B.Sc., F.I.C., Ph.C.
T. M. Sharp, M.Sc., A.I.C.
G. R. A. Short, Ph.C.
J. Small, D.Sc., Ph.C., F.L.S.
R. W. Wren.

A. J. Plowright, Ph.C., Secretary.

*Deceased.
†Resigned.

PHARMACY SUB-COMMITTEE.

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†Agnes T. Borrowman, Ph.C.
W. K. Fitch.
F. G. Hobart, Ph.C.
*L. S. Lindley.
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A. R. Melhuish, Ph.C.
C. A. Noble.
J. Wicliffe Peck, Ph.C.
R. H. Rowson, Ph.C.
H. Skinner, Ph.C.

F. Browne, F.I.C., Ph.C., Secretary.

DRESSINGS SUB-COMMITTEE.

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S. Crabtree.
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F. Farrell.
F. W. Hooper, M.B.E.
R. Hubbuck.
R. Dawson Hutchinson.
G. A. Mallinson.
A. R. Melhuish, Ph.C.
A. D. Powell, A.I.C.
H. Skinner, Ph.C.
H. N. Smith.
T. E. Wallis, B.Sc., F.I.C., Ph.C., F.L.S.

F. Browne, F.I.C., Ph.C., Secretary.

ACTION AND USES SUB-COMMITTEE.

G. R. Boyes, B.Sc., F.I.C., Ph.C., Chairman.

H. E. Archer, M.R.C.S., L.R.C.P., F.I.C., Ph.C.
H. E. Chapman.
*W. E. Dixon, M.D., F.R.S.
W. K. Fitch.
*R. Fouracre, Ph.C.
F. W. Gamble, Ph.C.
*J. T. Humphrey, Ph.C.
C. Wilson Peck, Ph.C.
F. Purse.
W. A. Robb, M.D., M.R.C.P., Ph.C.
H. Skinner, Ph.C.
J. G. Tait, M.R.C.S., L.R.C.P., Ph.C.

A. J. Plowright, Ph.C., Secretary.

*Deceased.
†Resigned.

BRITISH PHARMACEUTICAL CODEX, 1934.

Whilst the principal object of the British Pharmaceutical Codex is to provide a book of reference for pharmacists and medical practitioners, the need for a book of standards for drugs and preparations not included in the British Pharmacopœia is self-evident. In consequence, the scope of the Codex has been considerably extended in order to provide manufacturers, dispensers and users with a more uniform standard and guide for the composition of numerous medicaments which, although in fairly constant demand, are not included in the Pharmacopœia because of their similarity in action

to other drugs, or because their use as remedies has not yet received general acceptance, or their value for the treatment of a particular disease has not been confirmed by more recent advances in medical science.

Many additional chemical substances have been described, new monographs have been added on certain vegetable and animal substances, many new formulæ have been devised or selected for inclusion, and, by the application of more modern scientific principles, a large number of existing formulæ have been considerably improved. The addition of so much new matter has necessitated drastic modification of the existing information on many substances which are only occasionally used in present-day pharmaceutical practice. In order of retain information which might occasionally be required, many to these substances have been described in the form of subsidiary monographs in smaller type. In this way it has been found possible to increase the volume of information regarding newer medicaments without losing the value of some information on the older substances now only in occasional demand.

The inclusion of monographs on surgical dressings and of several appendices has necessitated a change in the plan of the book, which is now arranged in four parts. Part I consists of monographs on chemical substances and drugs of vegetable and animal origin. Part II contains monographs on surgical dressings and the basic vegetable and animal fibres used in their manufacture. Part III contains the galenical and other preparations of the Codex, and corresponds to the Formulary section of previous volumes. Part IV is composed of appendices containing tables, general tests, reagents, methods of sterilisation, a pharmacological index, trade-names and proprietary substances, etc.

Some Important Additions.

Amongst the more important substances which have been added are the following:—

Acetarsol
Acidum Hydrobromicum
Æther Anæstheticus
Æthylenum
Æthylhydrocupreinæ Hydrochloridum
Allobarbitonum
Ammonii Phosphas
Ammonii Tartras
Antimonii et Sodii Tartras
Antitoxinum Scarlatinum
Arsphenamina Argentica
Auri et Sodii Thiosulphas
Azorubrum
Barbitonum Solubile
Battista
Bismuthum Præcipitatum
Calcii et Sodii Lactas
Capsulæ Quininæ Ammoniatæ
Capsulæ Quininæ et Cinnamomi
Carbasus Chloraminæ
Carbasus Euflavinæ
Carbo Activatus
Carbonei Dioxidum
Cellulosum Ligni
Decoctum Aloes Compositum Concentratum
Decoctum Cinchonæ Concentratum
Decoctum Scoparii Concentratum
Derris
Elixir Æthylmorphinæ et Terpini
Elixir Ephedrinæ Hydrochloridi
Elixir Phenobarbitoni
Elixir Thymi
Elixir Valerianæ Compositum
Emplastrum Adhesivum
Emplastrum Zinci Oxidi
Emulsio Acriflavinæ

Emulsio Olei Morrhuæ et Creosoti
Emulsio Paraffini Liquidi Alkalina
Emulsio Paraffini Liquidi et Kaolini
Ephedra
Ephedrina
Ephedrinæ Hydrochloridum
Ergotoxinæ Æthanosulphonas
Euflavina
Extractum Apii Liquidum
Extractum Aurantii Liquidum
Extractum Ephedræ Liquidum
Extractum Malti cum Vitaminis
Extractum Papaveris Liquidum
Extractum Parathyroidei
Extractum Suprarenali Corticis
Extractum Thymi Liquidum
Extractum Valerianæ Liquidum
Guttæ Physostigminæ Oleosæ
Hexyl-resorcinol
Holarrhena
Indicarminum
Infusum Cinchonæ Acidum Concentratum
Injectio Camphoræ
Injectio Digitalini
Injectio Ferri et Arseni
Injectio Peptoni
Injectio Quininæ et Urethani
Injectio Sodii Morrhuatis
Insulinum
Ligamentum Elasticum Adhesivum
Ligamentum Pastæ Zinci
Linimentum Aconiti Oleosum
Liquor Azorubri
Liquor Ergosterolis Irradiati
Liquor Ferri Phosphatis Compositus
Liquor Phenolis Alkalinus
Liquor Tartrazinæ Compositus
Liquor Vitaminæ-A
Magnesii Sulphas Exsiccatus
Maranta
Mercurochromum
Mistura Bismuthi Hydroxidi
Mistura Bismuthi et Magnesii Hydroxidum
Mistura Magnesii Hydroxidi et Paraffini Liquidi
Mistura Quininæ Salicylatis
Nebula Adrenalinæ et Ephedrinæ
Nebula Adrenalinæ et Ephedrinæ Oleosa
Nebula Ephedrinæ Composita
Neoarsphenamina
Nitrogenii Monoxidum
Novaurantia
Oestrinum
Oleum Hippoglossi
Oleum Hydnocarpi
Oleum Rapæ
Oxygenium
Paradichlorbenzenum
Paraffinum Liquidum Leve
Pasta Magnesii Sulphatis
Pasta Tragacanthæ Composita
Phenobarbitonum
Phenobarbitonum Solubile
Pilulæ Ferri Carbonatis cum Arseno et Strychnina
Pilulæ Ferri Carbonatis et Arseni
Pilulæ Phenolphthaleini Compositæ
Pinus Alba
Potassii Hydroxyquinolini Sulphas
Potassii Quadroxalas
Procainæ Hydrochloridum
Proflavina
Psyllium
Pulvis Barii Sulphatis Compositus
Pulvis Effervescens Compositus Duplex
Pulvis Effervescens Compositus Fortis
Quininæ Disalicylosalicylas
Quininæ Phosphas
Saccharinum Solubile
Sodii Chaulmoogras
Sodii Morrhuas
Sodii Phosphas Exsiccatus
Sodii Sulphas Exsiccatus
Solvellæ Acidi Tannici Compositæ
Solvellæ Hydrargyri Oxycyanidi
Spiritus Methylatus Industrialis
Spiritus Methylatus Industrialis sine Acetono
Sulpharsphenamina
Suppositorium Bismuthi Subgallatis
Suppositorium Bismuthi Subgallatis Compositum
Syrupus Creosoti Compositus
Syrupus Iodotannicus cum Phosphate
Syrupus Pini Albæ Compositus
Tabellæ Acidi Acetylsalicylici Compositæ
Tabellæ Acidi Acetylsalicylici et Caffeinæ
Tabellæ Acidi Acetylsalicylici et Opii
Tabellæ Acidi Acetylsalicylici et Opii Compositæ
Tabellæ Barbitoni et Amidopyrinæ
Tabellæ Ferri Carbonatis et Aloini
Tabellæ Leptandræ Compositæ
Tabellæ Parathyroidei et Calcii Lactatis
Tabellæ Phenobarbitoni et Theobrominæ
Tartrazina
Thallii Acetas
Theophyllina
Theophyllina et Sodii Acetas
Tinctura Chloroformi et Morphinæ

Totaquina
Toxinum Scarlatinum
Triethanolamina
Tryparsonum
Unguentum Acidi Borici Flavum
Unguentum Ephedrinæ
Unguentum Potassii Polysulphidi
Unguentum Rubri Scarlatini
Unguentum Zinci cum Balsamo Peruviano
Unguentum Zinci et Benzoino
Unguentum Zinci cum Olei Ricini
Unguentum Zinci Morrhuatis
Ventriculus Desiccatus

The monographs of the separate parts are arranged, as formerly, in alphabetical order under latinised names, with English equivalents and synonyms, and the abbreviations of the full Latin names have been introduced as in the British Pharmacopœia, 1932. Abbreviations for drugs and preparations of the British Pharmaceutical Codex, 1923, were contained in a supplement published in 1925. In general, the individual monograph is divided in a manner somewhat similar to that adopted previously, but its form has been modified in several important respects by which the information given is made more readily available and more definite and useful in character.

STANDARDS FOR CODEX SUBSTANCES.

One of the principal features of the book is the inclusion of a series of requirements and tests under the heading of "Standard," which provides for manufacturers, producers, and all engaged in the preparation of medicaments, a more uniform standard than has been available hitherto for many compounds and preparations not included in the British Pharmacopœia. In this connection it should be noted that the Food and Drugs (Adulteration) Act requires a drug to be of the nature, substance and quality demanded by the purchaser, but provides no standard by which the quality is to be determined. In their search for a standard, the courts have turned to the British Pharmacopœia, which has become a presumptive standard for the articles contained in it. The standards of the British Pharmaceutical Codex are those which experience has shown to be desirable as criteria of purity for substances when used for medicinal purposes, and to be such as may be attained without undue difficulty or expense. As in the case of the British Pharmacopœia, the standards have been designed to be applied solely when the substances are sold for medicinal purposes.

The monographs of Part I fall broadly into three groups. Firstly, those substances for which a standard is laid down in the British Pharmacopœia and which therefore do not require any additional tests of purity. In all such cases a summary of the official requirements following the heading "Standard, B.P." is included for information, but for the details of the tests and processes reference must be made to the British Pharmacopœia. Secondly, those substances for which a Codex standard is prescribed. In many of these monographs the tests included are those which have been found satisfactory in expert hands, and for some of the newer substances it has been found necessary to devise new series of tests and requirements in order to provide efficient control. Wherever it has been found possible to

apply tests and assay processes of the British Pharmacopœia to Codex substances, it has been considered unnecessary to repeat the details of these tests, and users of the standards are required to consult the Pharmacopœia and to adopt its methods of procedure when applying tests of purity. The general tests for purity and methods of assay of the articles of the British Pharmaceutical Codex are based upon the tests and processes of the British Pharmacopœia, 1932. The special tests for chlorides, sulphates, arsenic, lead, etc., the assay processes for chemicals, oils, biological products, etc., and the methods used for the determination of melting-points, boiling-points, optical rotations, etc., mentioned in the standards for substances, are not reproduced in the British Pharmaceutical Codex, and reference must be made to the British Pharmacopœia for particulars of these tests, assays and methods. Thirdly, those substances upon which general information is required and for which, on account of their limited direct medicinal uses, it has not been considered advisable to prescribe quantitative requirements and tests of purity. In such cases the absence of a standard does not indicate that it is permissible to use for medicinal purposes material containing injurious impurities. Chemical substances within this group should be tested to ascertain their freedom from appreciable amounts of dangerous impurities, and vegetable and animal products should be examined for avoidable foreign matter which may be injurious to health.

Most of the tests require reagents which are included either in the appendices of the British Pharmacopœia, or are described in the monographs or appendix of the British Pharmaceutical Codex. In applying the tests, the reagents used should be either those of the British Pharmacopœia or those of the British Pharmaceutical Codex, or corresponding substances of suitable reagent quality. Unless stated otherwise, temperatures are on the centigrade scale, and solubilities and specific gravities are determined at 15·5°. Where the term "alcohol" occurs in defining solubilities, alcohol (90 per cent.) is indicated. Residues obtained by the ignition or incineration of organic chemical substances are given in terms of "ash" values, and it must be noted that these values are calculated on the original substance and not, as with crude vegetable drugs, on the material dried at 100°.

In the case of substances such as organic arsenic compounds, sera, toxins and vaccines which are described, the tests must be made, in Great Britain and Northern Ireland, in accordance with the regulations made under the Therapeutic Substances Act, 1925, and in other parts of the British Empire in accordance with any local law that may be in force.

The sections of the monographs on vegetable drugs dealing with microscopical characters have been amplified, and special attention has been given to the provision of diagnostic characters by which the drugs may be identified with greater certainty, especially when

they occur in the crushed or powdered form. Information concerning different varieties occurring in commerce, and the description of commonly occurring substitutes, have been collected into separate paragraphs and thereby made more accessible. The situation regarding powdered drugs has required careful consideration, and, in view of the fact that a vegetable drug in powder can seldom be examined quantitatively for the proportion of foreign or other organic matter present, a separate paragraph has been added in the case of many of the more important crude drugs frequently met with in the powdered state. This paragraph in general indicates the state of purity which should be required for a vegetable powder without direct reference to the maximum percentage of foreign matter that should be present. Such powders should be prepared from material which complies with the standard for the unground drug, and in cases where the foreign organic matter is determinable, powders must comply with the limits for foreign organic matter.

ACTION AND USES.

The descriptions of the pharmacological action and therapeutic uses, and other matter included, as previously, in the section of the monograph under the heading "Action and Uses," have been revised in the light of modern knowledge, and in many cases rearranged so as to render the work more valuable to medical practitioners. Therapeutic notes, which formerly were included in the summaries of the preparations at the ends of the monographs, have, where it has been thought useful to retain them, been transferred to this section, and notes concerning modern pharmaceutical methods have in many cases been added, such as methods by which solutions and suspensions for administration by injection may be prepared and sterilised. References to other substances having a somewhat similar action, but differing in composition from the substance of the monograph, no longer appear in this section. Descriptions of the properties of such related substances appear in the form of subsidiary monographs or, in cases where they are met with under proprietary trade-names, in an appendix.

As formerly, doses are given at the end of the monograph, and it is intended that they should be interpreted in the same way as the doses given for substances of the British Pharmacopœia. They are expressed both in the metric and Imperial systems. In the former system, weights are given in multiples or fractions of a gramme, and volumes in multiples or fractions of a millilitre, it being considered no longer advantageous or convenient to use terms such as "decigram" or "centimil," or to continue the use of the word "mil," which has not been found acceptable for general scientific purposes.

SUMMARIES OF THE PREPARATIONS.

The summaries at the end of the monograph include those preparations of the British Pharmacopœia which are not included in the

book in any other form, and of the surgical dressings and galenical preparations of the Codex which are described in detail in Part II and Part III of the book. These summaries are included for the purpose of assisting the prescriber in his choice of the form of the drug that he wishes to administer. It has not been deemed advisable or considered necessary to include preparations from foreign pharmacopœias in view of the fact that the Pharmacopœia and the Codex now contain all such preparations which the medical practitioner should require. The notes include references to preparations of the International Agreement of 1930, by which comparison may be made between preparations of the Codex and the requirements of the Agreement, and, by arrangement with the Pharmacopœia Commission, they indicate those preparations of the Codex which were contained in the British Pharmacopœia, 1914, and the changes which have been made in name or composition so that, if necessary, the preparation of the 1914 issue may be prepared from the formula of the Codex.

SURGICAL DRESSINGS.

The descriptions and requirements for surgical dressings in several cases have been extended and modified and, so far as possible, ambiguous statements concerning the strength of certain medicated dressings have been removed. Quantitative requirements are no longer obligatory in the case of dressings, such as phenol gauze, phenol tow and mercuric chloride gauze, from which, even when stored under the most favourable conditions, the medicament volatilises or is otherwise lost. In this section it has not been considered advisable to express measurements and weights of the dressings, or of the basic materials, entirely in the metric system. Hence, lengths and widths are expressed in inches and yards, and weights in grains and ounces (437·5 grains), whereas the metric system is retained for requirements and processes of a chemical nature. The test for neps in cotton wool has been revised to permit a quantitative comparison with an approved sample, and an arrangement has been made between the Council of the Pharmaceutical Society and the Manchester Testing House by which samples of cotton wool, not more neppy than the standard sample, may be obtained on application.

GALENICAL AND COMPOUNDED PREPARATIONS.

In the formulary section of the book several changes of importance have been made, including the addition of many new preparations and alterations in many of the older formulæ and processes. In this respect the formulary more accurately reflects modern pharmaceutical thought, and contains nearly every preparation or galenical, except those of the British Pharmacopœia, by means of which the more important drugs in present-day medical practice are administered or applied.

In deciding on the inclusion or omission of substances in common use, such as hair lotions and toilet preparations, which are not used for any medicinal properties they may happen to possess, notice has been taken of the fact that these articles are supplied by manufacturers according to their own formulæ, and where such preparations have been added or retained in the book, they have been included solely for the purpose of providing preparations suitable for use when dispensing the prescriptions of medical practitioners.

The preparations of former pharmacopœias, which are omitted from the British Pharmacopœia, 1932, and are still in frequent demand, are included as preparations of the Codex. Thus it has been possible to make improvements in the older preparations, in the same way as modern principles have been applied to former Codex preparations and those of the Pharmacopœia. This procedure, made possible by the co-operation and assistance of the Pharmacopœia Commission, has the additional advantage of making it possible for manufacturers to avoid having to prepare preparations from different authorities which show no differences in activity and may differ only slightly in composition or only in appearance. The same principle has been applied to preparations of the previous Codex which have been included in the British Pharmacopœia, 1932. Such articles have not been retained in the formulary, and information concerning any slight changes in composition is given in a note in the summary of the preparation at the end of the corresponding monograph.

The following preparations of the British Pharmacopœia, 1914, omitted from the British Pharmacopœia, 1932, have thus been included in Part III as preparations of the Codex: –

Acetum Cantharidini
Acidum Nitricum Dilutum
Acidum Nitro-Hydrochloricum Dilutum
Acidum Sulphuricum Aromaticum
Aqua Anisi
Aqua Aurantii Floris
Aqua Carui
Aqua Fœniculi
Aqua Laurocerasi
Aqua Menthæ Viridis
Aqua Rosæ
Argenti Nitras Mitigatus
Caffeinæ Citras Effervescens
Collodium
Collodium Vesicans
Confectio Piperis
Confectio Rosæ Gallicæ
Decoctum Agropyri
Decoctum Aloes Compositum
Decoctum Gossypii Radicis Corticis
Decoctum Hæmatoxyli
Emplastrum Calefaciens
Emplastrum Hydrargyri
Emplastrum Menthol
Emplastrum Saponis
Extractum Agropyri Liquidum
Extractum Aloes
Extractum Belæ Liquidum
Extractum Cannabis Indicæ
Extractum Ergotæ
Extractum Euonymi
Extractum Gossypii Radicis Corticis Liquidum
Extractum Grindeliæ Liquidum
Extractum Hydrastis Liquidum
Extractum Kavæ Liquidum
Extractum Opii Liquidum
Extractum Rhei
Extractum Strophanthi
Extractum Taraxaci
Extractum Viburni Liquidum
Glycerinum Pepsini
Glycerinum Plumbi Subacetatis
Glycerinum Tragacanthæ

Infusum Aurantii Compositum
Infusum Cascarillæ
Infusum Chiratæ
Infusum Cinchonæ Acidum
Infusum Ergotæ
Infusum Krameriæ
Infusum Rhei
Infusum Rosæ Acidum
Infusum Scoparii
Infusum Uvæ Ursi
Injectio Morphinæ Hypodermica
Injectio Strychninæ Hypodermica
Linimentum Ammoniæ
Linimentum Calcis
Linimentum Chloroformi
Linimentum Crotonis
Linimentum Hydrargyri
Linimentum Opii
Linimentum Potassii Iodidi cum Sapone
Linimentum Sinapis
Liquor Acidi Chromici
Liquor Ammonii Citratis
Liquor Arsenici Hydrochloricus
Liquor Atropinæ Sulphatis
Liquor Bismuthi et Ammonii Citratis
Liquor Calcis Chlorinatæ
Liquor Calcis Saccharatus
Liquor Ethyl Nitritis
Liquor Ferri Perchloridi Fortis
Liquor Ferri Persulphatis
Liquor Formaldehydi Saponatus
Liquor Hamamelidis
Liquor Hydrargyri Nitratis Acidus
Liquor Morphinæ Acetatis
Liquor Morphinæ Tartratis
Liquor Potassii Permanganatis
Liquor Sodæ Chlorinatæ
Liquor Sodii Arsenatis
Liquor Zinci Chloridi
Lithii Citras Effervescens
Lotio Hydrargyri Flava
Magnesii Sulphas Effervescens
Mistura Ammoniaci
Mistura Amygdalæ
Mistura Cretæ
Mistura Ferri Composita
Mistura Guaiaci
Mistura Olei Ricini
Oleum Phosphoratum
Pilula Aloes et Myrrhæ
Pilula Colocynthidis Composita
Pilula Hydrargyri Subchloridi Composita
Pilula Ipecacuanhæ cum Scilla
Pilula Phosphori
Pilula Plumbi cum Opio
Pilula Quininæ Sulphatis
Pilula Saponis Composita
Pilula Scillæ Composita
Pulvis Amygdalæ Compositus
Pulvis Antimonialis
Pulvis Catechu Compositus
Pulvis Cinnamomi Compositus
Pulvis Kino Compositus
Pulvis Opii Compositus
Pulvis Scammoniæ Compositus
Sevum Benzoatum
Sodii Citro-Tartras Effervescens
Spiritus Ammoniæ Fetidus
Spiritus Anisi
Spiritus Armoraciæ Compositus
Spiritus Cinnamomi
Spiritus Juniperi
Spiritus Lavandulæ
Spiritus Myristicæ
Spiritus Rosmarini
Succus Scoparii
Succus Taraxaci
Syrupus Acidi Hydriodici
Syrupus Aromaticus
Syrupus Aurantii Floris
Syrupus Calcii Lactophosphatis
Syrupus Cascaræ Aromaticus
Syrupus Chloral
Syrupus Codeinæ Phosphatis
Syrupus Ferri Phosphatis
Syrupus Rhei
Syrupus Rhœados
Syrupus Rosæ
Tinctura Aconiti
Tinctura Arnicæ Florum
Tinctura Berberidis
Tinctura Buchu
Tinctura Cannabis Indicæ
Tinctura Cantharidini
Tinctura Cascarillæ
Tinctura Chiratæ
Tinctura Chloroformi et Morphinæ Composita
Tinctura Cinnamomi
Tinctura Cubebæ
Tinctura Ergotæ Ammoniata
Tinctura Ferri Perchloridi
Tinctura Gelsemii
Tinctura Guaiaci Ammoniata
Tinctura Hamamelidis
Tinctura Hydrastis
Tinctura Jalapæ
Tinctura Jalapæ Composita
Tinctura Kino
Tinctura Lavandulæ Composita
Tinctura Opii Ammoniata
Tinctura Podophylli
Tinctura Pruni Virginianæ
Tinctura Pyrethri
Tinctura Quininæ
Tinctura Sennæ Composita

Tinctura Serpentariæ
Trochiscus Acidi Benzoici
Trochiscus Catechu
Trochiscus Ferri Redacti
Trochiscus Guaiaci Resinæ
Trochiscus Ipecacuanhæ
Trochiscus Kino Eucalypti
Trochiscus Morphinæ
Trochiscus Potassii Chloratis
Trochiscus Santonini
Trochiscus Sulphuris
Unguentum Aconitinæ
Unguentum Aquæ Rosæ
Unguentum Atropinæ
Unguentum Belladonnæ
Unguentum Cantharidini
Unguentum Cetacei
Unguentum Chaulmoograe
Unguentum Cocainæ
Unguentum Creosoti
Unguentum Eucalypti
Unguentum Gallæ
Unguentum Gallæ cum Opio
Unguentum Hamamelidis
Unguentum Hydrargyri Iodidi Rubri
Unguentum Hydrargyri Oxidi Flavi
Unguentum Hydrargyri Oxidi Rubri
Unguentum Iodi
Unguentum Iodoformi
Unguentum Lanæ Compositum
Unguentum Picis Liquidæ
Unguentum Plumbi Iodidi
Unguentum Plumbi Subacetatis
Unguentum Potassii Iodidi
Unguentum Resinæ
Unguentum Staphisagriæ
Vinum Antimoniale
Vinum Colchici
Vinum Ferri
Vinum Ferri Citratis
Vinum Quininæ

The following preparations of the British Pharmacopœia, 1914, have not been included as preparations of the Codex, but, where necessary, information concerning their composition is included in the text in Part I.—

Acetum Urgineæ
Decoctum Acaciæ Corticis
Decoctum Ispaghulæ
Decoctum Sappan
Extractum Colchici
Extractum Picrorhizæ Liquidum
Infusum Alstoniæ
Injectio Apomorphinæ Hypodermica
Injectio Cocainæ Hypodermica
Injectio Ergotæ Hypodermica
Liquor Pancreatis
Mucilago Gummi Indici
Oxymel Urgineæ
Pilula Ipecacuanhæ cum Urginea
Pilula Urgineæ Composita
Pulvis Buteæ Seminum
Pulvis Kaladanæ Compositus
Syrupus Urgineæ
Tinctura Alstoniæ
Tinctura Daturæ Seminum
Tinctura Kaladanæ
Tinctura Oliveri Corticis
Tinctura Picrorhizæ
Tinctura Podophylli Indici
Tinctura Urgineæ
Tinctura Valerianæ Indicæ Ammoniata
Unguentum Myrobalani
Unguentum Myrobalani cum Opio
Vinum Ipecacuanhæ

As in other parts of the book, the preparations of Part III are included in the alphabetical order of the latinised names, except in the case of the effervescent salts, which are arranged alphabetically in one group under the general heading of Granulæ Effervescentes.

The general information preceding most groups or classes of preparations has been rewritten, and for certain groups new paragraphs have been added. These sections, as formerly, contain general notes on the individual groups, and in some cases have been used for the purpose of offering advice to dispensers or of establishing rulings with reference to methods of dispensing.

In the sections on eye-lotions, pastilles, lozenges, tablets, and certain other preparations, formulæ consisting of a single active ingredient

which is frequently required in different strengths or varying doses are not included, and the general paragraph gives the strength of the preparation or the amount of medicament in each unit that should be supplied by the dispenser when the strength or quantity is not stated by the prescriber. The formulæ for tablets, which are now included under the more general name of Tabellæ, have been modified so as to permit of a reasonable variation in the quantities of substances used for granulating and lubricating. In the case of compound tablets, the quantities required to be present in each tablet are set out in a formula, but the kind and quantity of granulating and lubricating agents necessary may be varied or may be decided by reference to the instructions in the general paragraph. Formulæ for emulsions include definite quantities of emulsifying agents, but, in view of the fact that the amount required for the preparation of a satisfactory emulsion in a mortar may be much greater than is required to emulsify the same volume of oil by means of a homogeniser, permission is given in the general instructions to vary the amounts when necessary.

A change in the setting of the formulæ has been made, the older and sometimes ambiguous centesimal system has been replaced by the now widely used metric system, and the alternative and still very commonly used Imperial system has been retained. No ambiguity between the two systems will arise if it is observed that they are not interchangeable; in making any preparation, one or the other system must be followed in its entirety throughout. For convenience in the setting, under both systems weights and measures are expressed by abbreviations. Grammes and millilitres are represented by "g" and "ml" respectively, the former being now the more widely used abbreviation for gramme in scientific literature, and the latter the now universally recognised abbreviation for the millilitre. Metric measures used in the British Pharmaceutical Codex are graduated at 20°, and one litre of water in glass, at 20°, in air weighs therefore approximately 997 grammes. Imperial measuring vessels are graduated at 16·7°, and one fluid ounce of water, at 16·7°, in air, weighs 1 ounce (437·5 grains). A solution containing one-tenth of an ounce (43·75 grains) of a solid in 1 fluid ounce, therefore, is not exactly equivalent to a solution containing 10 grammes of a solid in 100 millilitres. Nevertheless, for all practical purposes the difference between corresponding percentage solutions in the two systems may be ignored. The tables in Appendix II for the conversion of percentages or formulæ in grammes per litre into percentages or formulæ in grains per pint, etc., in the Imperial system are based upon a 10 per cent. solution in the Imperial system which contains 43·75 grains of a solid in 1 fluid ounce of solution and not on 43·847 grains, which is the calculated figure based on a 10 per cent. solution in the metric system.

In the case of certain groups of preparations containing alcohol, namely, concentrated infusions, spirits and tinctures, figures are

included for the percentage of alcohol normally required to be present. Alcohol in formulæ for certain pharmaceutical preparations used externally, or which do not contain alcohol in the final product, and for the manufacture of certain other preparations may, by permission of the Board of Customs and Excise, be replaced by industrial methylated spirit, provided that the law and the statutory regulations are observed. A note at the end of the monograph is included to indicate whether, subject to the observance of the law and the regulations made under statute by the Board of Customs and Excise, industrial methylated spirit may be used.

THE APPENDICES.

The appendices contain much additional matter. The tables for the conversion of quantities in the metric system into equivalent quantities in the Imperial system have been condensed, and their use has been illustrated by suitable examples. The atomic weights are those agreed upon by the International Committee on Atomic Weights. A list of molecular weights in frequent use in analytical operations, and particulars of reagents used in the testing of chemical and vegetable substances and for certain clinical and other tests have been added. Other sections give the methods for conducting the arsenic and lead limits of Codex substances, particulars regarding colloidal solutions, and the methods by which solutions or preparations for injection should be sterilised.

The pharmacological index has been revised and modified considerably. It has been thought advisable to discontinue the inclusion of a general index of drugs based mainly on their therapeutic uses and on diseases, and to replace it by a list based, as far as possible, upon pharmacological principles.

The index of trade-names and proprietary substances is an important feature of the book. It contains trade-names for substances of the British Pharmacopœia and the British Pharmaceutical Codex, and for many substances which are only met with in commerce or used in medicine under registered or proprietary names. These are arranged alphabetically, information is given regarding their relation to the substances of the book, and an indication is given of the source from which further information may be obtained. The attention of pharmacists and dispensers is again directed to the fact that when a medicament is ordered under a proprietary trade-name, it is not permissible to substitute a similar product to which that trade-name does not legally apply.

CO-OPERATION AND ASSISTANCE.

The Codex Revision Committee have received invaluable advice and assistance from members of the Sub-Committees and from many other voluntary helpers, and they desire to record their indebtedness for the most generous and willing assistance which has been given and which has so greatly facilitated the work of revision.

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During this revision the book has been rewritten, and the co-ordination of the recommendations of the sub-committees has consequently imposed an exceptionally heavy responsibility upon the Editor. The Council acknowledge with gratitude the ability with which Mr. Corfield has discharged this responsibility.

ABBREVIATIONS

USED IN THE

BRITISH PHARMACEUTICAL CODEX

B.P.	=	British Pharmacopœia, 1932.
B.P.C.	=	British Pharmaceutical Codex, 1934.
fl. oz.	=	fluid ounce.
g.	=	gramme.
gr.	=	grain.
I.A.	=	International Agreement, 1930.
m.	=	minim.
ml.	=	millilitre.
oz.	=	ounce (avoir.).
v/v	=	volume in volume.
v/w	=	volume in weight.
w/v	=	weight in volume.
w/w	=	weight in weight.

The British Pharmaceutical Codex

PART I

ABRUS
(Abrus)
Abrus

Synonyms—Abri Semina; Jequirity; Jumble Beads; Prayer Beads.

Abrus consists of the seeds obtained from a small climbing plant, *Abrus precatorius* Linn. (Fam. Leguminosæ), which is a native of India and is now common in Brazil, the West Indies and other tropical countries.

The seeds are ovoid or sub-globular in shape and vary from 5 to 8 millimetres in length and from 4 to 5 millimetres in breadth; 100 seeds weigh from 14 to 14·5 grammes; they are hard with a smooth, glossy surface and of a bright, scarlet-red colour with a black patch at the hilum. Microscopically they show the characters common to leguminous seeds generally; the scarlet colour is due to the presence of a red colouring matter in the palisade epidermis of the testa and is changed to orange-red by alkalis; the black patch is due to a dark violet pigment in the palisade epidermis in that region. A very characteristic feature of the seeds is the sub-epidermal layer of the bearer cells; these are about six or seven times as high as they are wide and are connected with each other laterally by short projections in all directions; their height is about 150 microns. The cotyledons consist of very thick-walled pitted cells which contain protein but no starch.

Abrus **contains** two poisonous proteins, a paraglobulin and a phytalbumose, a mixture of the substances being known as abrin. The activity of the globulin is destroyed at 75° to 80° and that of the albumose at 85°.

Substitutes.—Other varieties of abrus seeds occur in commerce. Two of them are white or yellow in colour, due to the absence of pigment from the palisade epidermis, and a third variety is entirely black. These varieties should not be used for making preparations.

Action and Uses.—Abrin resembles snake venom in its action and is much less poisonous when taken internally than when absorbed from wounds. Applied to mucous surfaces it acts as a violent irritant. For application to the eye in the treatment of granular lids and opacity of the cornea, an infusion of abrus (Infusum Abri; 1 in 12½) has been used. This should be freshly prepared since it decomposes rapidly unless about 2 per cent. of boric acid is added. It has been used diluted with from 2 to 20 parts of water, but must be employed with caution since it produces

inflammation that is dangerous and difficult to control, although its action can, to some extent, be checked by the application of hot compresses of solution of mercuric chloride (1 in 10,000). Its use should be discouraged.

ABSINTHIUM

(Absinth.)

Absinthium

Synonyms—Old Woman; Wormwood.

Absinthium consists of the dried leaves and flowering tops of *Artemisia Absinthium* Linn. (Fam. Compositæ), a perennial undershrub, indigenous to Northern Asia and Europe, and naturalised in the United States. It should be gathered when the plant is in flower.

The leaves are alternate, roundish-triangular, bi- or tripinnate and petiolate, the ultimate segments being linear-oblong and obtuse; the uppermost leaves (bracts) are entire, sessile and lanceolate. The inflorescence consists of hemispherical drooping capitula, each about 5 millimetres in diameter, arranged in a panicle; the florets are all tubular, pale yellow in colour and have no pappus. The entire herb is covered with a silky, grey tomentum and the receptacle with white, paleaceous hairs. It has an intensely bitter and aromatic taste and a strong, characteristic, aromatic odour.

The diagnostic **microscopical** characters are the epidermal cells with wavy side walls; stomata rare on the upper surface and numerous on the under surface; hairs of two kinds, balance hairs with a short, usually three-celled stalk, surmounted by a long, spindle-shaped cell, and glandular hairs typical of the family Compositæ; the spherical pollen grains with smooth walls and three pores; the hairs of the receptacle, each consisting of a short stalk and a large, ovoid, cylindrical, terminal cell reaching a length of 1 millimetre; the absence of calcium oxalate crystals.

Absinthium **contains** a volatile oil, of which the fresh herb yields about 0·3 per cent. The oil is dark green or sometimes blue in colour, and has a strong odour and a bitter, acrid taste. The oil contains thujone (absinthol or tanacetone, an isomeride of camphor), thujyl alcohol (both free and combined with acetic, *iso*valerianic and other acids), cadinene, phellandrene and pinene. The herb also contains the bitter glycoside, absinthin ($C_{15}H_{20}O_4$, silky crystals, melting-point, about 68°), a bitter principle, anabsinthin (crystalline, melting-point, about 258°), a yellow, crystalline substance, and absinthic acid.

Substitute.—The leaves and flowering tops of *Artemisia vulgaris* Linn., mugwort, are sometimes substituted for absinthium. Mugwort is distinguished by the dark green, almost glabrous, upper surface of the leaves, the under surface being densely tomentose, and by the slight odour and taste.

Standard.—Absinthium contains not more than 5 per cent. of

foreign organic matter and stems having a maximum width of more than 5 millimetres. Acid-insoluble ash, not more than 1 per cent.

Absinthium, in powder (Pulvis Absinthii : Pulv. Absinth.), contains the constituents and possesses the diagnostic microscopical characters of Absinthium, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—A characteristic action of absinthium is stimulation of the cerebral hemispheres, similar to the effect of camphor. Habitual use or large doses produce absinthism, which is shown by restlessness, vomiting, vertigo, tremors, and convulsions in which the patient loses consciousness, falls down, has clonic convulsions, may bite his tongue, pass water, and foam at the mouth. Absinthium is administered in the form of tincture. In most countries its use in wines is prohibited.

Preparation

Tinctura Absinthii, B.P.C.—(Tinct. Absinth.)—Tincture of Absinthium. 1 in 10. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

ACACIA

(Acac.)

Acacia

Synonyms—Acaciæ Gummi; Gum Acacia.

Acacia, a variety of gum arabic, is the dried gummy exudation from the stem and branches of *Acacia Senegal* Willd., a small tree indigenous to East and West Africa, and of some other species of *Acacia* (Fam. Leguminosæ). The gum exudes spontaneously from the stem and branches, but the flow is usually stimulated by incisions in the bark.

The gum occurs in rounded or ovoid tears about 0·5 to 4 or sometimes 6 centimetres in diameter. The tears are colourless or have a yellowish tint; they are brittle, opaque from the presence of numerous minute fissures and are often broken into angular fragments with glistening surfaces. Acacia is odourless and has a bland, mucilaginous taste. It is almost entirely soluble in water (1 in 1) forming a slightly acid solution or mucilage which is not ropy or glairy. It is insoluble in alcohol (90 per cent.). A 1 in 10 aqueous solution is slightly lævorotatory. The acid-insoluble ash is about 0·1 per cent.

Acacia **contains** arabin in combination with calcium, magnesium and potassium. It also contains oxidising, peroxidising and diastasic ferments, together with about 12 per cent. or more of water, and yields from 2·7 to about 4 per cent. of ash, consisting chiefly of calcium, magnesium and potassium carbonates. Arabin yields arabinose, galactose and glycuronic acid on hydrolysis.

Varieties.—Many varieties of acacia occur in commerce, but the most esteemed is that collected in Kordofan, the best varieties of which are almost colourless. Mogadore gum closely approaches it in quality, but is of less fine appearance. The best qualities of Senegal gum are also suitable for pharmaceutical use; they are less opaque than the Kordofan gum and contain occasional pieces of vermiform shape.

Substitutes.—Many dark coloured kinds of gum arabic occur in commerce and are used for various industrial purposes.

Standard, B.P.—Acacia loses, on drying at 100°, not more than 15 per cent. of its weight. Ash, not more than 5 per cent. It complies also with tests for the absence of starch, tannin and dextrin.

Acacia, in powder (Pulvis Acaciæ: Pulv. Acac.), contains the constituents and possesses the properties of Acacia, and complies with the standard for the unground drug.

Action and Uses.—Acacia is used medicinally as a demulcent and as a colloid. It is **administered** in mixtures, cough syrups and linctuses in the form of mucilage, in various jujubes and pastilles, and as Injectio Sodii Chloridi et Acaciæ for intravenous injection. The colloid content and osmotic pressure of this injection are equal to those of the blood. It does not leave the blood vessels and is preferable, therefore, to saline solution alone. In cases of severe hæmorrhage from abdominal wounds and arteries it has great value in raising and maintaining the blood pressure. It is also used in cases of shock where the blood pressure has fallen dangerously low.

In dispensing, acacia is used as a pill excipient, either alone or as Pulvis Acaciæ Compositus which is a mixture of powdered acacia and powdered tragacanth in equal parts, and as a suspending agent in mixtures containing insoluble powders, but it is unsuitable with bismuth salts, with which it may form flaky masses. Powdered acacia is also used for the emulsification of fixed and volatile oils; in the case of fixed oils and oleoresins, one part of powdered acacia may be at once incorporated with four parts of the oil, the subsequent addition of twice as much water as acacia producing the primary emulsion; volatile oils require one part of acacia to two parts of oil; in the case of resinous tinctures, mucilage of acacia may be used in the proportion of not less than one-sixteenth part of the finished mixture. Solutions for **injection** may be sterilised by heating in an autoclave at 121° to 122° for one hour. Acacia is **incompatible** with strong alcohol, borax, ferric salts, calomel and lead subacetate, and with acids, unless well diluted.

GUMMI INDICUM.—Indian gum is an exudation from the stem of *Anogeissus latifolia* Wall. (Fam. Combretaceæ), a large tree indigenous to India and Ceylon. The gum occurs in rounded tears about 0·5 to 1 centimetre in diameter and in vermiform pieces about 0·5 centimetre in diameter and 3 to 4 centimetres long. The colour varies from yellowish-white to brownish; the surface is dull and somewhat rough, and free from cracks. It is brittle, with a glassy fracture, and the constituents resemble those of acacia. Indian gum has demulcent properties resembling those of gum arabic. It is an excellent emulsifying agent, and forms a nearly colourless mucilage with water. The mucilage (Mucilago Gummi Indici, 1 to 3) should be freshly prepared. Indian gum is used in India and the Eastern Colonies in making preparations for which acacia is used, but only 1 part of Indian gum is used instead of 2 parts of acacia.

Preparations

Injectio Sodii Chloridi et Acaciæ, B.P.—(Inj. Sod. Chlorid. et Acac.)—Injection of Sodium Chloride and Acacia. A sterile solution containing sodium chloride, 0·9 per cent. w/v, and acacia, 6 per cent. w/v, in freshly distilled water.

Mucilago Acaciæ, B.P.—(Mucil. Acac.)—Mucilage of Acacia. *Syn.*—Mucilage of Gum Acacia. Acacia, 40 per cent. w/w, dissolved in chloroform water. It should be stored in well-filled containers. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Pulvis Tragacanthæ Compositus, B.P.—(Pulv. Trag. Co.)—Compound Powder of Tragacanth. Tragacanth, 15 per cent., and acacia, 20 per cent., with starch and sucrose Dose.– 0·6 to 4 grammes (10 to 60 grains)

Syrupus Acaciæ, B.P.C.—(Syr. Acac.)—Syrup of Acacia. Mucilage of acacia, 1 in 4, in syrup. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

ACACIÆ CORTEX

(Acac. Cort.)

Acacia Bark

Synonyms—Babul Bark; Wattle Bark.

Acacia bark is the dried bark of *Acacia arabica* Willd. (Fam. Leguminosæ), a tree which grows in India, Arabia and Africa, and also of *A. decurrens* Willd., which is indigenous to Australia. The bark is collected from wild or cultivated trees at least seven years old and is allowed to mature for twelve months before use.

The bark of *A. arabica* (babul bark) is hard, reddish-brown in colour, frequently covered with a thick, blackish periderm, rugged, and much fissured longitudinally and transversely; the inner surface is reddish-brown, longitudinally striated and fibrous; it breaks with difficulty and exhibits a fibrous fracture; the taste is astringent. The bark of *A. decurrens* (wattle bark) is compact, in curved or channelled pieces, greyish-brown externally, darkening with age, often with irregular, longitudinal ridges; the inner surface is reddish-brown, finely striated longitudinally and, when broken, exhibits a coarsely fibrous fracture; the smoothed, transverse surface has a waxy appearance; the taste is astringent.

Babul bark **contains** about 20 per cent. of tannin and wattle bark contains about 22 to 36 per cent., the maximum amount being present in the bark of trees from seven to ten years old; gallic acid is also present.

Action and Uses.—Acacia bark is astringent. It is administered in the form of a decoction (Decoctum Acaciæ Corticis, 6 in 100; dose.– ½ to 2 fluid ounces), which is also used as a gargle, lotion, or injection.

ACALYPHA

(Acalyph.)

Acalypha

Synonyms—Acalyphæ Herba; Indian Acalypha; Mukta-jhuri.

Acalypha consists of the fresh or dried entire plant, *Acalypha indica* Linn. (Fam. Euphorbiaceæ), an erect, annual weed indigenous to the

plains of India, usually being found in the neighbourhood of habitations. It is collected when in flower.

The plant grows to a height of from 30 to 60 centimetres. The root is vertical, woody, somewhat tortuous and of a pale buff colour. The stem attains a diameter of about 5 millimetres; it is cylindrical and longitudinally grooved. The leaves are ovate to rhomboid ovate, about 5 by 3·5 centimetres in size, serrate, except the lower tapering part, 3-nerved, the two outer nerves branching on the outside only. The inflorescence consists of small axillary spikes of male and female flowers of a greenish colour. The spikes are shorter than the leaves and the female flowers are enclosed in funnel-shaped involucres.

Acalypha **contains** the alkaloid acalyphine; other constituents are resin, tannin and volatile oil.

Substitutes.—*Acalypha paniculata* Miquel and other species of *Acalypha* are also used medicinally in India.

Action and Uses.—Acalypha is a gastro-intestinal irritant. It acts reflexly as an expectorant, but in large doses is an emetic; it has been used as a substitute for ipecacuanha.

ACETANILIDUM

(Acetanilid.)

Acetanilide

$C_8H_9ON = 135·1$

Synonym—Antifebrin.

Acetanilide, $C_6H_5NH·CO·CH_3$, may be prepared by the action of glacial acetic acid on aniline. It occurs in colourless, odourless, shining, lamellar crystals with a slightly pungent taste. When heated with sodium hydroxide solution, aniline is liberated, and the mixture, if warmed with a little chloroform, develops the unpleasant odour of phenyl isocyanide. The aqueous solution gives with bromine solution a yellowish-white precipitate.

Soluble in water (1 in 210), boiling water (1 in 18), alcohol (90 per cent.) (1 in 4·2), chloroform, ether, acetone, benzene and glycerin; slightly soluble in light petroleum.

Standard.—Acetanilide melts between 113° and 115°. Ash, not more than 0·1 per cent. Shake 1 gramme with 20 millilitres of water and filter; the filtrate is not affected by ferric chloride solution (distinction from phenacetin), and is neutral to litmus paper.

Action and Uses.—In fever, acetanilide produces a marked fall in temperature which is accompanied by profuse perspiration and is probably due to direct depression of the heat-regulating mechanism of the brain. Large doses depress the circulation and the heart with

consequent collapse, and also lead to the formation of methæmoglobin from the hæmoglobin of the blood, which is then no longer able to take up oxygen, and cyanosis results. The formation of methæmoglobin may also result from continued use. Some persons are exceedingly susceptible to acetanilide, and even small doses will lead to cyanosis and collapse; occasionally erythematous rashes occur. Should caffeine or the opium alkaloids be given with acetanilide its toxicity is raised; with sodium bicarbonate or alkalis generally its toxicity is lowered. Acetanilide possesses distinct pain-allaying power, which appears to be due to depression of the basal ganglia of the brain, and not the cerebral cortex as in the case of morphine. It is employed for the relief of neuralgia, myalgia, migraine, the pain of influenza, sciatica, the crises of locomotor ataxy, and pain of uterine or ovarian origin such as that of dysmenorrhœa. When applied locally to mucous membrane or to denuded surfaces, it has a slight analgesic action. It is used for relieving the pain of ulcers, but not more than a small proportion of a dusting powder should consist of acetanilide, since it may be absorbed in quantity sufficient to produce toxic symptoms.

Acetanilide may be **administered** in cachets or in the form of powders or tablets. It may be suspended in water with the aid of mucilage of acacia or compound powder of tragacanth. With many organic substances, including chloral hydrate, phenol, thymol and resorcinol, acetanilide may form pasty masses; with spirit of nitrous ether it may produce a yellow or red colouration which may be delayed if a little sodium bicarbonate is added previously. In cases of **poisoning** by acetanilide an emetic should be given, or the stomach washed out with an alkali; warmth should be applied to the feet and body and means adopted to increase the activity of the medullary centres, especially the respiratory and vasomotor; strychnine in doses of $\frac{1}{30}$ grain, administered subcutaneously, is valuable, and artificial respiration may be required.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains). Doses exceeding 5 grains are sometimes ordered, but in susceptible individuals may cause alarming symptoms.

Preparations

Pulvis Acetanilidi Compositus, B.P.C.—(Pulv. Acetanilid. Co.)—Compound Acetanilide Powder. Acetanilide, 70 per cent.; caffeine, 10 per cent.; sodium bicarbonate, 20 per cent. Dose.– 0·2 to 0·3 gramme (3 to 5 grains).

Tabellæ Acetanilidi Compositæ, B.P.C.—(Tab. Acetanilid. Co.)—Compound Tablets of Acetanilide. Each tablet contains 2 grains of acetanilide, $\frac{1}{2}$ grain of caffeine and 1 grain of sodium bicarbonate. Dose.– 1 or 2 tablets.

Tabellæ Acetanilidi Compositæ cum Codeina, B.P.C.—(Tab. Acetanilid. Co. c. Codein.)—Compound Tablets of Acetanilide with Codeine. Each tablet contains 2 grains of acetanilide, $\frac{1}{2}$ grain of caffeine, 1 grain of sodium bicarbonate and $\frac{1}{8}$ grain of codeine. Dose.– 1 or 2 tablets.

ACETANNIN

(Acetann.)

Acetannin

Synonym—Acetyltannic Acid.

Acetannin may be obtained by heating tannic acid with acetic anhydride on a water-bath for one hour, adding alcohol to the mixture, pouring into water, and drying the washed precipitate at a temperature not exceeding 60°. It varies in composition and is probably a complex mixture of partially acetylated derivatives of tannin. Acetannin occurs as a yellowish or greyish-white powder which darkens on exposure to light. It is odourless or has a faintly acetous odour. When dissolved in solutions of the alkalis or alkali carbonates it decomposes gradually into alkali tannate and acetate, the solution gradually deepening in colour. It is precipitated by the addition of water to its solution in acetic acid. On shaking 0·2 gramme with 2 millilitres of alcohol and 2 millilitres of sulphuric acid the odour of ethyl acetate is developed. It should be **stored** in the dark in a dry place and in well-closed containers.

Soluble in ethyl acetate and solutions of borax and of sodium phosphate; very slightly soluble in water, alcohol and ether.

Standard.—Acetannin loses, on drying at 100°, not more than 3 per cent. of its weight. Ash, not more than 0·3 per cent. Shake 5 grammes for five minutes with 95 millilitres of water and filter into a Nessler glass, add 2 millilitres of ferrous tartrate solution and dilute to 100 millilitres; the colour produced is not deeper than that produced by 0·01 gramme of tannic acid (limit of tannic acid). Shake 1 gramme for five minutes with 50 millilitres of water and filter; 25 millilitres of the filtrate requires not more than 1·2 millilitres of N/10 sodium hydroxide for neutralisation, using phenolphthalein as indicator (limit of free acid). Not more than 3 per cent. of soluble matter is extracted on shaking 1 gramme with 200 millilitres of water at frequent intervals during two hours (limit of soluble matter).

Action and Uses.—Acetannin was introduced as a substitute for tannic acid for use as an intestinal astringent, on the supposition that, being insoluble in weak acid, it would pass through the stomach unchanged and be decomposed into alkali tannate in the duodenum. This change takes place only in part; some of the acetannin passes through the alimentary canal without decomposition, and a trace is absorbed as sodium gallate and excreted in the urine. Acetannin is used for the treatment of acute intestinal catarrh after the cause of the inflammation has been removed, and also for the chronic diarrhœa of children. It should be **administered** in cachets or mixed with lactose and suspended in milk. It is **incompatible** with alkalis, salts of iron and bismuth subnitrate.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

METHYLENEDITANNIN.—Methyleneditannin, or methylditannin, is a condensation product of tannic acid and formaldehyde and may be prepared by mixing aqueous solutions of tannic acid and formaldehyde, precipitating completely with hydrochloric acid, washing the product with water, and drying at a moderate temperature. It occurs as a pale fawn to chocolate-brown, odourless, tasteless powder melting at about 220° to 240°, with decomposition. It is insoluble in water or acids, soluble in alcohol and the usual organic solvents, also in solutions of ammonia with yellow colouration, and in solutions of sodium and potassium hydroxides with reddish-brown colouration. Methyleneditannin is antiseptic and astringent and has been given internally for diarrhœa. It may be used as a dusting powder, either alone or diluted with starch, 1 in 5, or 1 in 10, for eczema, pruritus and bedsores. Dose.– 0·3 to 1 gramme (5 to 15 grains).

ACETARSOL

(Acetarsol)

Acetarsol

$C_8H_{10}O_5NAs = 275{\cdot}0$

Synonym—Acetarsone.

Acetarsol, $CH_3CONH{\cdot}C_6H_3(OH)AsO(OH)_2$, is 3-acetylamino-4-hydroxyphenylarsonic acid, and may be prepared by the reduction of 3-nitro-4-hydroxyphenylarsonic acid and subsequent acetylation of the amino-acid thereby produced. It forms a sodium salt which is a white powder soluble in about eight parts of cold water. Acetarsol occurs as a white, crystalline powder and melts at 240° to 250°.

Practically **insoluble** in cold water; moderately soluble in boiling water; insoluble in alcohol and dilute acids; soluble in dilute alkalis.

Standard.—Acetarsol contains not less than 27·0 and not more than 27·4 per cent. of As. 5 millilitres of the solution, obtained by shaking 1 gramme with 10 millilitres of water and filtering, complies with the limit test for chlorides. 0·1 gramme suspended in 1 millilitre of chromic acid solution does not impart a brown colour to the solution (limit of free amino-acid).

Assay.—Dissolve 0·2 gramme, accurately weighed, in about 20 millilitres of water by the addition of a few drops of N/1 sodium hydroxide, add 5 grammes of ammonium persulphate and boil the solution until colourless. Add 40 millilitres of 2N oxalic acid and boil until carbon dioxide ceases to be evolved, add 10 millilitres of 2N sulphuric acid and 1 gramme of potassium iodide and boil until the solution assumes a pale straw colour; decolourise by the addition of a drop or two of N/10 sodium thiosulphate, dilute with water to about 150 millilitres, add 30 millilitres of 2N sodium carbonate and an excess of sodium bicarbonate, and titrate with N/10 iodine, using mucilage of starch as indicator; each millilitre of N/10 iodine is equivalent to 0·003747 gramme of As.

Action and Uses.—Acetarsol possesses the advantage over the arsphenamines of being therapeutically active when given by the mouth. It has been used in the treatment of syphilis, malaria, yaws

and relapsing fever, as well as in amœbiasis, and may be of value in the virus infections. In chronic cases of amœbic dysentery which have become emetine resistant, 0·25 gramme (4 grains) by the mouth, twice daily, is of special value, as also in cases in which emetine is contra-indicated, namely, cardiac lesions, pregnancy, and for children. It may also be combined with emetine. A single dose of 1 gramme of acetarsol by the mouth, or of its sodium salt intravenously or intramuscularly, is effective in removing the simple tertian parasites of malaria from the blood stream, but malignant tertian and quartan forms are unaffected. Acetarsol has been used in the prophylactic treatment of suspected cases of syphilis. In the treatment of general paralysis the best results are obtained in megalomania and psychical disturbances. Injections of 0·5 to 1·5 grammes (8 to 25 grains) of the sodium salt are given three times a week until 20 grammes in all has been given. Solutions for **injection** may be prepared by aseptic methods. Various toxic effects of acetarsol have been recorded; they do not differ from those seen after the administration of neoarsphenamine. Premedication with dextrose and alkalis is important.

Dose.– For children, 0·03 gramme ($\frac{1}{2}$ grain); for adults, 0·25 gramme (4 grains).

ACETONUM
(Aceton.)

Acetone

$C_3H_6O = 58·05$

Acetone, or dimethylketone, $CH_3·CO·CH_3$, may be prepared by the fractionation of pyroligneous acid, by the dry distillation of barium acetate, or, with butyl alcohol, by the Fernbach process, in which starch is fermented by a special ferment. It may also be obtained synthetically from acetylene. Acetone occurs as a clear, colourless, mobile and volatile liquid, with a characteristic odour and a pungent, sweetish taste. A 0·5 per cent. aqueous solution with a few drops of sodium nitroprusside solution and sodium hydroxide solution, on the addition of a slight excess of acetic acid, produces a deep red liquid which turns violet on dilution with water.

Acetone occurs in small quantities as a constituent of normal urine, and in larger amounts in that of diabetics. It may be detected by the nitroprusside test or by the following salicylaldehyde test: when to 10 millilitres, 1 gramme of potassium hydroxide and 10 drops of salicylaldehyde are added and the mixture warmed to 70° without shaking, a purplish-red ring develops; as little as 0·0001 per cent. of acetone in aqueous solution can be detected by this test, which is not given by either methylethylketone or aromatic ketones. 10 millilitres of a 0·1 per cent. solution in alcohol (50 per cent.), on the addition of 1 millilitre of 1 per cent. solution of *o*-nitrobenzaldehyde in alcohol (50 per cent.) followed by 1 millilitre of 15 per cent. sodium hydroxide solution, produces on acidification with acetic acid a bluish-green

colouration. Absolute acetone boils at 56·5°. As found in commerce, acetone contains about 99 per cent. by weight of absolute acetone. It is inflammable, its flash-point being 1·8°. It should be **stored** in well-closed containers in a cool place, remote from fire or lights.

Miscible with water, alcohol (90 per cent.), methyl alcohol, ether, fatty acid esters, and chloroform, in all proportions.

Standard, B.P.—Acetone has a specific gravity of 0·796 to 0·801. Not less than 95 per cent. distils between 56° and 58°. Residue on evaporation, not more than 0·01 per cent. w/v. It complies also with tests for alkalinity, acidity, methyl alcohol and other readily oxidisable substances, and for solubility in carbon disulphide.

Action and Uses.—The physiological action of acetone is similar to that of ethyl alcohol. Acetone is only occasionally administered internally and has been used in the form of a spray for inhalation in dyspnœa and spasmodic conditions such as asthma, but is of little value. It is used as a vehicle for volatile oils for inhalation. Acetone should not be used as a solvent for iodine, since the vapours of the solution are extremely irritating to the eyes. It is a useful solvent for resins, fats, cantharidin, pyroxylin, celluloid, etc.; owing to its low boiling-point, it is also a good menstruum for extracting certain drugs, since the extract can be evaporated at low temperatures.

ACETOPHENONUM.—Acetophenone, or phenylmethylketone, $C_6H_5{\cdot}CO{\cdot}CH_3$, occurs as a colourless or slightly yellowish, oily liquid, with an odour recalling that of bitter almond and jasmin. It melts at about 18° and boils at 200°; specific gravity, about 1·035. It is insoluble in water, but very soluble in alcohol, ether, chloroform, olive oil and almond oil. Acetophenone has been used as a hypnotic, but is uncertain in its action and is liable to cause ill effects. A solution in almond oil (1 in 10) may be administered as an emulsion or in gelatin capsules. Dose.– 0·2 to 0·5 millilitre (3 to 8 minims).

ALCOHOL DIACETONICUM.—Diacetone alcohol, or diacetone, $(CH_3)C(OH)CH_2{\cdot}CO{\cdot}CH_3$, may be obtained by the action of alkalis on acetone. When pure, it occurs as an odourless, colourless liquid, miscible with water, alcohol and benzene. The commercial product has a specific gravity of about 0·915 to 0·945 and a boiling-range of about 160° to 166°. It is used as a solvent in the manufacture of lacquers and varnishes.

BENZOPHENONUM.—Benzophenone, or diphenylketone, $(C_6H_5)_2CO$, occurs in white, rhombic crystals of pronounced aromatic odour. Melting-point, about 48°; boiling-point, about 306°. It is insoluble in water, but readily soluble in alcohol and ether. Benzophenone is the typical aromatic ketone used in experimental comparisons of different groups of hypnotics; its hypnotic properties are inferior to those of the aliphatic ketones. Dose.– 0·2 to 0·5 gramme (3 to 8 grains).

ACIDUM ACETICUM

(Acid. Acet.)

Acetic Acid

$C_2H_4O_2 = 60{\cdot}03$

Acetic acid may be obtained by the destructive distillation of wood, or by the dilution of glacial acetic acid. It occurs as a clear, colourless, pungent liquid with a sharp, acid taste.

Miscible with water, alcohol (90 per cent.) and glycerin, in all proportions.

Standard, B.P.—Acetic acid contains not less than 32·5 per cent. and not more than 33·5 per cent. w/w of $C_2H_4O_2$. Specific gravity, 1·044 to 1·045. Residue on evaporation, not more than 0·01 per cent. w/w. Arsenic limit, 2 parts per million. Lead limit, 1 part per million. It complies also with limit tests for chloride, sulphate, oxidisable impurities and formic acid.

Action and Uses.—Acetic acid is oxidised in the body and is excreted in the urine as carbonate; it is mildly diaphoretic, diuretic and expectorant. Applied externally, it has an irritant action, and is therefore useful in liniments. The acid, well diluted (1 in about 30), is employed as a gargle. Acidum Aceticum Dilutum is used to sponge the skin in fevers and as a lotion for the scalp. It is **administered** in mixtures in the form of the dilute acid, oxymel, or oxymel of squill.

ACETUM.—Malt vinegar is produced by the oxidation of fermented malt-wort by means of the organism, *Mycoderma aceti*. It occurs as a brown liquid and contains not less than 4 per cent. w/v of $C_2H_4O_2$, with traces of other organic acids, sugar, dextrin, colouring matter and characteristic esters. Malt vinegar contains at least 0·05 per cent. of phosphates, calculated as P_2O_5, and about 1·5 to 3 per cent. of solid matter. Specific gravity, 1·014 to 1·025. Malt vinegar has the action of dilute acetic acid and is used as a domestic remedy as a lotion for bruises and sprains.

CRUDE PYROLIGNEOUS ACID is the brown aqueous liquid obtained in the destructive distillation of wood. It contains methyl alcohol, acetic acid, acetone, and numerous other substances. Rectified pyroligneous acid is obtained from the crude acid by distillation.

Preparations

Acetum Odoratum, B.P.C.—(Acet. Odorat.)—Toilet Vinegar. Acetic acid, 1 in 8, with odorants. For aromatic vinegar, see Acidum Aceticum Aromaticum (under Acidum Aceticum Glaciale).

Acidum Aceticum Dilutum, B.P.—(Acid. Acet. Dil.)—Dilute Acetic Acid. It contains 6 per cent. w/w of $C_2H_4O_2$ (limits, 5·7 to 6·3). Specific gravity, about 1·008; arsenic limit, 0·4 part per million; lead limit, 0·5 part per million. It complies also with limit tests for readily oxidisable impurities, formic acid and oxidisable impurities, chloride, sulphate and residue on evaporation. Dose.—2 to 4 millilitres (½ to 1 fluid drachm).

ACIDUM ACETICUM GLACIALE

(Acid. Acet. Glac.)

Glacial Acetic Acid

$C_2H_4O_2 = 60·03$

Glacial acetic acid, $CH_3 \cdot COOH$, may be obtained by the distillation of dried sodium or calcium acetate with strong sulphuric acid, or by synthesis. It occurs as a clear, colourless liquid, or as a colourless, crystalline mass, with a strong pungent odour. At temperatures below 10°

it crystallises, and melts again at about 15°. Boiling-point, about 117°, the acid distilling unchanged. A variety of glacial acetic acid melting at 10° is also met with in commerce. Acid of "60°" is a commercial variety; it melts at 15·5° and corresponds to an acid stronger than 99 per cent. The addition of a small amount of water lowers the melting-point considerably, an acid containing about 13 per cent. of water melting below 0°. The acid is not inflammable at ordinary temperatures, but the vapour burns with a blue flame. Flash-point, about 44°.

Miscible with water, and with most fixed and volatile oils.

Standard, B.P.—Glacial acetic acid contains not less than 99 per cent. w/w of $C_2H_4O_2$. Freezing-point, not less than 14·8°. Specific gravity, 1·055 to 1·058. Residue on evaporation, not more than 0·01 per cent. w/w. Arsenic limit, 6 parts per million. Lead limit, 3 parts per million. It complies also with limit tests for chloride, sulphate, oxidisable impurities and formic acid.

Action and Uses.—Glacial acetic acid is not administered internally. When inhaled by the nostrils glacial acetic acid induces a reflex stimulation of the medullary centres. It is, therefore, employed together with odorants, as in Acidum Aceticum Aromaticum, as a restorative and stimulant in cases of fainting. Externally, it is used as a rubefacient, vesicant or caustic, according to the length of time it is in contact with the skin. It is commonly employed for the destruction of warts and corns. In cases of **poisoning** by glacial acetic acid large draughts of water containing soap or magnesia, chalk and oil, or gruel, should be given.

ACETIC ANHYDRIDE, $(CH_3CO)_2O$, is a colourless liquid. Specific gravity, about 1 085. Boiling-point, about 138°. It is not employed medicinally, but large quantities are used as a reagent and in the manufacture of acetyl derivatives.

Preparation

Acidum Aceticum Aromaticum, B.P.C.—(Acid. Acet. Aromat.)—Aromatic Acetic Acid. *Syn.*—Aromatic Vinegar. Glacial acetic acid, approximately 74 per cent. v/v, with odorants. For toilet vinegar, see Acetum Odoratum (under Acidum Aceticum).

ACIDUM ACETYLSALICYLICUM

(Acid. Acetylsalicyl.)

Acetylsalicylic Acid

$C_9H_8O_4 = 180·1$

Synonym—Aspirin.

Acetylsalicylic acid $C_6H_4(O·CO·CH_3)·COOH$, is *o*-acetoxybenzoic acid, and may be prepared by the action of acetic anhydride or acetyl

chloride on salicylic acid. The general use of the synonym "aspirin" is limited to Great Britain and Northern Ireland. It occurs in colourless, odourless, acicular crystals, or as a white, crystalline powder, with a slightly acid taste. It dissolves in solutions of alkalis and alkali carbonates, and in solutions of alkali citrates and ammonium acetate with partial decomposition and formation of salicylates. Boil 0·5 gramme for a few minutes with 10 millilitres of sodium hydroxide solution, cool, and add an excess of dilute sulphuric acid; a crystalline precipitate, giving the reactions of salicylates, is produced, and an odour of acetic acid is perceptible. 0·1 gramme, boiled with 10 millilitres of water, gives a violet-red colouration with one drop of ferric chloride solution. Acetylsalicylic acid is stable in dry air, but in contact with moisture it gradually hydrolyses into acetic and salicylic acids. It should be **stored** in well-stoppered bottles, in a dry place.

Soluble in water (about 1 in 300), alcohol (90 per cent.) (1 in 5), ether (about 1 in 20) and chloroform (1 in 17).

Standard, B.P.—Acetylsalicylic acid contains not less than 99·5 per cent. of $C_9H_8O_4$. Melting-point, 135° to 138°. Ash, not more than 0·05 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for readily carbonisable substances and free salicylic acid.

Action and Uses.—Acetylsalicylic acid is antipyretic and analgesic. It is slowly decomposed in the alimentary tract, yielding salicylic acid and salicylates; its action, therefore, resembles, but is stronger than, that of sodium salicylate. Acetylsalicylic acid is eliminated rapidly by the kidneys, excretion beginning only a short time after the drug is administered. The acid is prescribed in rheumatic conditions, including rheumatic fevers, for headache, neuralgia and influenza. In certain individuals, relatively small doses of acetylsalicylic acid produce violent reactions, of which skin eruptions and asthma are the most common symptoms. Acetylsalicylic acid may be **administered** in cachets, powders, tablets, as a mixture in which the acid is suspended by means of compound powder of tragacanth, or dissolved by the aid of potassium citrate or solution of ammonium acetate. The powder is applied locally at frequent intervals in the early stages of tonsillitis and after the removal of tonsils. Acetylsalicylic acid with Dover's powder is given as an antipyretic in acute febrile diseases, and in conjunction with phenacetin as an analgesic. Doses of 1·3 to 2·6 grammes (20 to 40 grains) are sometimes given by rectal injection before operations. **Poisoning** by acetylsalicylic acid is treated by emetics or lavage of the stomach, followed by cardiac and other stimulants.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

ACIDUM CITROSALICUM.—Citrosalic acid is methylenecitrylsalicylic acid, $C_{19}H_{14}O_7(COOH)_2$, and occurs as a white, odourless, almost tasteless, crystalline powder, melting at about 145°. It is hydrolysed by alkalis. It is almost insoluble in water, but soluble in alcohol and, with difficulty, in chloroform and ether.

Preparations

Mistura Acidi Acetylsalicylici, B.P.C.—(Mist. Acid. Acetylsalicyl.)—Mixture of Acetylsalicylic Acid. *Syn.*—Aspirin Mixture. Each fluid ounce contains 15 grains of acetylsalicylic acid with compound powder of tragacanth and chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Mistura Acidi Acetylsalicylici Composita, B.P.C.—(Mist. Acid. Acetylsalicyl. Co.)—Compound Mixture of Acetylsalicylic Acid. *Syn.*—Compound Aspirin Mixture. Each fluid ounce contains 15 grains of acetylsalicylic acid and 30 grains of potassium citrate with syrup of lemon and chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Tabellæ Acidi Acetylsalicylici Compositæ, B.P.C.—(Tab. Acid. Acetylsalicyl. Co.)—Compound Tablets of Acetylsalicylic Acid. *Syn.*—Compound Aspirin Tablets. Each tablet contains 3½ grains of acetylsalicylic acid, 2½ grains of phenacetin and ½ grain of caffeine. Dose.– 1 or 2 tablets.

Tabellæ Acidi Acetylsalicylici et Caffeini, B.P.C.—(Tab. Acid. Acetylsalicyl. et Caffein.)—Tablets of Acetylsalicylic Acid and Caffeine. Each tablet contains 4 grains of acetylsalicylic acid and 1 grain of caffeine. Dose.– 1 to 3 tablets.

Tabellæ Acidi Acetylsalicylici et Opii, B.P.C.—(Tab. Acid. Acetylsalicyl. et Opii)—Tablets of Acetylsalicylic Acid and Opium. *Syn.*—Tablets of Aspirin and Dover's Powder. Each tablet contains 2½ grains of acetylsalicylic acid and 2½ grains of powder of ipecacuanha and opium. Dose.– 1 to 3 tablets.

Tabellæ Acidi Acetylsalicylici et Opii Compositæ, B.P.C.—(Tab. Acid. Acetylsalicyl. et Opii Co.)—Compound Tablets of Acetylsalicylic Acid and Opium. Each tablet contains 3 grains of acetylsalicylic acid, 1¼ grains of phenacetin and 1 grain of powder of ipecacuanha and opium. Dose.– 1 to 4 tablets.

ACIDUM AGARICUM

(Acid. Agaric.)

Agaric Acid

$C_{22}H_{40}O_7,1\frac{1}{2}H_2O = 443{\cdot}3$

Synonym—Agaricin.

Agaric acid is obtained from *Fomes officinalis* Faull. (Fam. Polyporaceæ), a fungus growing on larch trees. It occurs as a nearly white, microcrystalline powder, which is almost odourless and tasteless.

Slightly **soluble** in water and alcohol (1 in 130); solutions in caustic alkalis froth freely.

Standard.—Agaric acid melts at about 140°. Ash, not more than 0·5 per cent. It dissolves in boiling water to form a perfectly clear foaming liquid.

Action and Uses.—The characteristic effect of agaric acid is to cause tonic contraction of plain muscle throughout the body. When given by the mouth it acts as an anhidrotic and it has been suggested that this action is produced by tonic contraction of the muscle surrounding the sweat glands. The chief use of agaric acid is for controlling the night-sweats in phthisis and other forms of hyperhidrosis. It is superior to atropine in that it does not cause dryness of the mouth and throat, and has little effect on the pupil of the eye, although it is more apt to

upset digestion. It is absorbed slowly, and the dose should therefore be taken some hours before retiring. Agaric acid may be **administered** in pills or cachets; since large doses have a purgative action, some preparation of opium is frequently added. It should not be administered hypodermically, since it causes intense pain and inflammation at the site of injection.

Dose.– 0·005 to 0·03 gramme ($\frac{1}{12}$ to $\frac{1}{2}$ grain).

ACIDUM BENZOICUM

(Acid. Benz.)

Benzoic Acid

$C_7H_6O_2 = 122·0$

Benzoic acid, $C_6H_5 \cdot COOH$, may be obtained from benzoin, storax and balsams of tolu and Peru, in which it occurs naturally, or it may be prepared synthetically by the oxidation of toluene or benzyl chloride. It occurs in white, light, feathery plates or needles, almost odourless when prepared synthetically, or with a slight, aromatic odour when obtained from benzoin, etc. It volatilises readily at a temperature much below its boiling-point, forming a feathery sublimate, and it is also slowly volatile in a current of steam, and in boiling benzene or other volatile liquid. A solution of 0·2 gramme neutralised with sodium hydroxide solution produces a buff-coloured precipitate with ferric chloride solution.

Soluble in water (1 in 450), boiling water (1 in 12), alcohol (1 in 3), ether (1 in 2·5), chloroform (1 in 7), and in fixed and volatile oils.

Standard, B.P.—Benzoic acid contains not less than 99·5 per cent. of $C_7H_6O_2$. Melting-point, 121° to 122°. Ash, not more than 0·05 per cent. Arsenic limit, 2 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for chlorinated compounds, cinnamic acid, and for readily carbonisable substances.

Action and Uses.—Benzoic acid has an antiseptic action similar to that of salicylic acid; the presence of 0·1 per cent. of the free acid inhibits the growth of most bacteria. Taken **internally** it is rapidly absorbed and affects metabolism in the same way as do the salicylates; it combines with glycine and is excreted in the urine as hippuric acid. This action appears to be of the nature of a protective process since the hippurates are rapidly absorbed and have no toxic action. After the use of this drug, the urine contains less aromatic sulphate and indican, and this is regarded as evidence of diminished putrefaction in the intestine. It is used in chronic cystitis and other genito-urinary diseases to diminish the alkalinity and putridity of the urine, but unlike salicylic acid it has little influence on rheumatic diseases. Compound benzoic acid ointment is employed in the treatment of ringworm of the scalp and body. The acid is sometimes **administered** in

cachets, but is better given in pills massed with glucose and tragacanth; for its local action on the throat as an expectorant and antiseptic, Trochisci Acidi Benzoici are suitable. When prescribed in mixtures the acid should be suspended with mucilage of tragacanth, or with syrup. The ammonium and sodium salts, however, are better for use in mixtures as they do not irritate the mucous membrane. For inhalation, the effect of benzoic acid is generally obtained by the use of compound tincture of benzoin which is of great service when inhaled with steam in the treatment of acute laryngitis and hoarseness.

Benzoic acid and benzoates may be used as preservatives in unfermented grape juice and non-alcoholic wine made from it, other sweetened or unsweetened non-alcoholic wines, cordials and fruit juices, sweetened mineral waters, brewed ginger beer, coffee extract, and pickles and sauces made from fruit or vegetables. The proportions, calculated as parts of benzoic acid per million, must not exceed those specified in the Public Health (Preservatives, etc., in Food) Regulations, 1925.

Dose.—0·3 to 1 gramme (5 to 15 grains).

BENZOYLIS PEROXIDUM.—Benzoyl peroxide, $C_6H_5{\cdot}CO{\cdot}O_2{\cdot}CO{\cdot}C_6H_5$, has been used in the form of a dusting powder and, mixed with soft paraffin, as an ointment in the treatment of burns and of dermatitis caused by poison ivy (*Rhus toxicodendron*).

METHYLIS ANTHRANILAS.—Methyl anthranilate, $C_6H_4NH_2{\cdot}COOCH_3$, is the methyl ester of *o*-aminobenzoic acid, and is present in oil of neroli and other essential oils. It may be prepared synthetically from phthalic anhydride, and occurs as a crystalline solid melting at 24°. It is used in perfumery.

METHYLIS BENZOAS.—Methyl benzoate, or oil of niobe, $C_6H_5{\cdot}COOCH_3$, may be prepared by esterifying benzoic acid with methyl alcohol. It occurs as a colourless liquid with a powerful odour, having a specific gravity of about 1·102 and a boiling-point of 199°. It is used in perfumery.

Preparations

Trochisci Acidi Benzoici, B.P.C.—(Troch. Acid. Benz.)—Benzoic Acid Lozenges. Each lozenge contains ½ grain of benzoic acid.

This lozenge, containing 0·03 *gramme of benzoic acid, was included in the British Pharmacopœia,* 1914.

Unguentum Acidi Benzoici Compositum, B.P.C.—(Ung. Acid. Benz. Co.)—Compound Benzoic Acid Ointment. *Syn.*—Whitfield's Ointment. Benzoic acid, 5 per cent., and salicylic acid, 3 per cent., in white soft paraffin and coconut oil.

ACIDUM BORICUM

(Acid. Boric.)

Boric Acid

$H_3BO_3 = 61{\cdot}84$

Synonym—Boracic Acid.

Boric acid, $B(OH)_3$, may be obtained by the purification of native boric acid, or by the interaction of sulphuric acid and native borates.

It occurs in colourless, odourless, unctuous, shining scales or crystals, or in powder, with a sweetish after-taste. Boric acid is a weak acid and its alkali salts, which are hydrolysed, particularly in dilute solution, are alkaline. It volatilises in steam. On heating to 100° it loses water and is partly converted into metaboric acid, HBO_2; tetraboric (pyroboric) acid, $H_2B_4O_7$, is formed at 140° to 160°, and boric anhydride, B_2O_3, at higher temperatures. Boric acid may be identified, and small amounts may be detected, by the pink colour imparted to turmeric paper which has been dipped in a solution slightly acidified with hydrochloric acid and dried; the colour changes to blue or greenish-black with solution of ammonia or of sodium hydroxide. An alcoholic solution burns with a flame tinged with green.

Soluble in water (1 in 25), boiling water (1 in 3), glycerin (1 in 4) and alcohol (1 in 30).

Standard, B.P.—Boric acid contains not less than 99·5 per cent. of H_3BO_3. Arsenic limit, 5 parts per million. Lead limit, 25 parts per million. It complies also with tests for sulphate and for solubility in boiling alcohol.

Action and Uses.—Boric acid is a mild antiseptic; it inhibits the growth of putrefactive and saprophytic organisms, but does not destroy them. Taken internally, large doses cause gastro-intestinal irritation and smaller doses, over a long period, may exert a deleterious effect. The excretion of boric acid is very slow, so that it is cumulative. This, and the fact that it is without taste or odour, renders it the more dangerous. **Externally**, solutions of the acid are non-irritating and are used to wash out cavities after operations, and for application to wounds and ulcers; in the solid form it is employed as a dusting powder or for application to simple ulcers about the mouth and tongue. It may not be used freely with impunity since symptoms of poisoning from absorption sometimes occur. Several instances of fatal poisoning are on record from considerable quantities of solution having been left in body cavities.

Boric acid may be **administered** in cachets, in pastilles made with glycogelatin, or in mixtures flavoured with syrup of orange. It is prescribed with tincture of hyoscyamus and infusion of buchu. Aqueous solutions, sometimes more conveniently prepared from the crystals, are of service as mouth-washes, eye lotions and skin lotions, to allay irritation, as douches for irrigating the bladder and vagina, and as hot fomentations for ulcers, whitlows, boils and carbuncles. A saturated solution in alcohol may be used for instillation into the ear, and a simple solution in glycerin for painting the throat. Solutions may be sterilised by heating at 100° for thirty minutes, or by heating in an autoclave. The acid is also used as an antiseptic dusting powder, generally mixed with starch, zinc oxide, or talc; for this purpose, and for preparing ointments a very fine powder should be employed. Bougies, pessaries and suppositories containing boric acid may be prepared either with oil of theobroma or with glycerin suppository basis. The acid is also

used in the form of lint, gauze and wool. The use of boric acid as a food preservative is now prohibited.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Boroglycerinum, B.P.C.—(Boroglycer.)—Boroglycerin. A mixture of glyceryl borate, boric acid and glycerin containing the equivalent of about 50 per cent. w/w of boric acid.

Carbasus Acidi Borici, B.P.C.—(Carbas. Acid. Boric.)—Boric Acid Gauze. *Syn.*—Boric Gauze. It contains from 10 to 20 per cent. of boric acid.

Collyrium Acidi Borici, B.P.C.—(Collyr. Acid. Boric.)—Boric Acid Eye Lotion. Boric acid in distilled water, 1 in 50.

Collyrium Acidi Borici et Zinci, B.P.C.—(Collyr. Acid. Boric. et Zinc.)—Boric Acid and Zinc Eye Lotion. Each fluid ounce contains about 4 grains of boric acid and 1 grain of zinc sulphate in distilled water.

Glycerinum Acidi Borici, B.P.—(Glycer. Acid. Boric.)—Glycerin of Boric Acid. A mixture of glyceryl borate and glycerin, containing the equivalent of 31 per cent. w/w of boric acid, prepared by heating boric acid with glycerin. It contains less boric acid than boroglycerin. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Gossypium Acidi Borici, B.P.C.—(Gossyp. Acid. Boric.)—Boric Acid Wool. *Syn.*—Boric Wool. It contains from 15 to 30 per cent. of boric acid.

Linteum Acidi Borici, B.P.C.—(Lint. Acid. Boric.)—Boric Acid Lint. *Syn.*—Boric Lint; Boracic Lint. It contains from 35 to 45 per cent. of boric acid.

Liquor Calcis Chlorinatæ cum Acido Borico, B.P.C.—(Liq. Calc. Chlorinat. c. Acid. Boric.)—Solution of Chlorinated Lime with Boric Acid. *Syn.*—Eusol. It contains when freshly prepared about 0·4 per cent. w/v of available chlorine.

Lotio Acidi Borici, B.P.C.—(Lot. Acid. Boric.)—Boric Acid Lotion. Boric acid, 1 in 30, in distilled water.

Oculentum Acidi Borici, B.P.C.—(Oculent. Acid. Boric.)—Boric Acid Eye Ointment. Boric acid, 4 per cent., in simple eye ointment.

Pulvis Acidi Borici et Amyli, B.P.C.—(Pulv. Acid. Boric. et Amyli)—Boric Acid and Starch Powder. Boric acid and starch, equal parts.

Pulvis Talci Boricus, B.P.C.—(Pulv. Talc. Boric.)—Boric Talc Powder. *Syn.*—Talcum Boratum. Boric acid and starch, of each 1 in 10, with purified talc, perfumed with oil of geranium.

Pulvis Zinci et Acidi Borici, B.P.C.—(Pulv. Zinc. et Acid. Boric.)—Zinc and Boric Acid Powder. Zinc oxide and boric acid, equal parts.

Pulvis Zinci Sulphatis Compositus, B.P.C.—(Pulv. Zinc. Sulph. Co.)—Compound Zinc Sulphate Powder. *Syn.*—Pulvis Acidi Borici Compositus; Compound Boric Acid Powder; Pulvis Antisepticus Solubilis; Soluble Antiseptic Powder. Zinc sulphate, 12·5 per cent., with eucalyptol, menthol, phenol, salicylic acid, thymol and boric acid.

Unguentum Acidi Borici, B.P.—(Ung. Acid. Boric.)—Ointment of Boric Acid. *Syn.*—Boric Acid Ointment; Boric Ointment; Boracic Ointment. Boric acid 10 per cent., in white paraffin ointment.

Unguentum Acidi Borici Flavum, B.P.C.—(Ung. Acid. Boric. Flav.)—Yellow Boric Acid Ointment. Boric acid, 10 per cent., in yellow soft paraffin.

ACIDUM CAMPHORICUM

(Acid. Camph.)

Camphoric Acid

$C_{10}H_{16}O_4 = 200{\cdot}1$

Camphoric acid, $C_8H_{14}(COOH)_2$, may be prepared by oxidising camphor with nitric acid. It occurs in colourless, flaky crystals, or as a crystalline powder, with an acid, bitterish taste. Its solutions when neutralised give a yellowish-brown precipitate with ferric chloride and a light blue precipitate with copper sulphate.

Soluble in water (1 in 160), alcohol (1 in 1·5) and ether; only slightly soluble in chloroform.

Standard.—Camphoric acid contains not less than 99·5 per cent. of $C_{10}H_{16}O_4$. Melting-point, 185° to 187°. Ash, not more than 0·1 per cent.

Assay.—Dissolve about 0·4 gramme, accurately weighed, in 25 millilitres of alcohol and titrate with N/10 sodium hydroxide, using phenolphthalein as indicator; each millilitre of N/10 sodium hydroxide is equivalent to 0·01001 gramme of $C_{10}H_{16}O_4$.

Action and Uses.—Camphoric acid has a mild camphor-like action, and has been used for controlling the night-sweats of phthisis. Its anhidrotic action has been ascribed to stimulation of the respiratory centre. It may be **administered** in cachets or capsules, or in mixtures suspended with compound powder of tragacanth. When used as an anhidrotic the dose should be given two or three hours before bedtime. Camphoric acid is also employed in solution (0·2 to 5 per cent., with sufficient alcohol) as a local antiseptic for the nose and throat.

Dose.– 0·5 to 2 grammes (8 to 30 grains).

ACIDUM CINNAMICUM

(Acid. Cinnam.)

Cinnamic Acid

$C_9H_8O_2 = 148{\cdot}1$

Cinnamic acid, $C_6H_5{\cdot}CH{:}CH{\cdot}COOH$, may be obtained from storax, balsam of Peru, or balsam of tolu, or synthetically by the interaction of benzaldehyde, acetic anhydride and sodium acetate. It occurs in colourless, odourless, or slightly aromatic crystals, which are at first tasteless, but afterwards produce a burning sensation. On warming with potassium permanganate solution the odour of benzaldehyde is produced. It should be **stored** in well-closed, amber-coloured bottles.

Soluble in water (1 in 3500); more readily soluble in boiling water; freely soluble in alcohol.

Standard.—Cinnamic acid, determined by the method of the British Pharmacopœia for Acidum Benzoicum, contains not less than 99 per cent. of $C_9H_8O_2$; each millilitre of N/2 sodium hydroxide is equivalent to 0·07403 gramme of $C_9H_8O_2$. Melting-point, 132° to 135°. Ash, not more than 0·05 per cent. When 1 gramme is shaken with 100 millilitres of boiled and cooled water at 20° at intervals during one hour and filtered, 50 millilitres of the filtrate requires for neutralisation not more than 1·6 millilitres of N/10 sodium hydroxide, using phenolphthalein as indicator (limit of benzoic acid).

Action and Uses.—Cinnamic acid has an antiseptic action similar to that of benzoic acid. Its use by injection or by the mouth has been vaunted as a cure for tuberculosis, emphasis being laid on its power to induce leucocytosis; it is doubtful, however, if such an effect is produced in man. It is used chiefly as the sodium salt, since solutions of the acid give rise to some pain when injected hypodermically.

Dose.– 0·12 to 0·2 gramme (2 to 3 grains); 0·0013 to 0·02 gramme ($\frac{1}{50}$ to $\frac{1}{3}$ grain), by injection.

BENZYLIS CINNAMAS.—Benzyl cinnamate, $C_6H_5{\cdot}CH{:}CH\ COOCH_2{\cdot}C_6H_5$ is the benzyl ester of cinnamic acid. A solution containing benzyl alcohol and ethyl cinnamate in olive oil corresponding to 5 per cent. of benzyl cinnamate is known as Jacobson's solution. It is given by intramuscular injection in doses of 0·5 to 1 millilitre (8 to 15 minims) in tuberculosis of the lungs and tuberculous glands and fistulæ.

SODII CINNAMAS.—Sodium cinnamate, $C_6H_5{\cdot}CH{:}CH{\cdot}COONa$, occurs as a white, granular, amorphous powder or as a white, crystalline powder, having a faintly aromatic odour and a slightly alkaline reaction. It is soluble in water (1 in 11), alcohol (1 in 160), and in glycerin. It is a convenient form for administering cinnamic acid. Solutions for injection may be sterilised by tyndallisation or by filtration. Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

ACIDUM CITRICUM

(Acid. Cit.)

Citric Acid

$C_6H_8O_7,H_2O = 210·1$

Citric acid, $C_3H_4(OH)(COOH)_3,H_2O$, may be obtained from the juice of lemons and other fruits produced by species of *Citrus*, or prepared from glucose. It occurs in colourless, prismatic crystals, or as a white powder, efflorescent in warm dry air, and slightly hygroscopic in moist air. It is odourless and has a strongly acid taste. An 8 per cent. aqueous solution of the acid corresponds in strength to average samples of lemon juice. Citric acid begins to lose water at 75°; at 135° it becomes anhydrous; it fuses at about 153°, and is decomposed into water and aconitic acid, $C_6H_6O_6$, at about 175°. On the gradual addition of potassium permanganate solution to an aqueous solution of citric acid which has been warmed with mercuric sulphate solution, the potassium permanganate is decolourised and a white precipitate is formed.

Soluble in water (10 in 6), alcohol (2 in 3) and glycerin (1 in 2); slightly soluble in ether.

Standard, B.P.—Citric acid contains not less than 99·5 per cent. and not more than the equivalent of 101 per cent. of $C_6H_8O_7,H_2O$. Ash, not more than 0·05 per cent. Arsenic limit, 1 part per million. Lead limit, 20 parts per million. It complies also with tests for tartaric acid and readily carbonisable matter, oxalic acid, sulphate, copper and iron.

Action and Uses.—Citric acid is partly absorbed from the alimentary canal and this portion is decomposed, being excreted by the kidneys in the form of sodium carbonate. It is used in dilute solution, in the form of lemon or lime juice, as a cooling drink in fevers. The alkali citrates increase the secretion of urine and render it less acid. For the administration of citric acid in the free state, lemon juice or syrup of lemon may be used. The value of lemon juice as a prophylactic and cure for scurvy is due to the presence of vitamin C, but orange juice is now preferred for this purpose (see Succus Aurantii and Succus Limonis). Citric acid is commonly **administered** in effervescing mixtures, in which it is directed to be added, in the form of powder or solution, to an alkaline mixture. Draughts prepared with a slight excess of acid are more agreeable; the following are the proportions necessary to form approximately neutral mixtures:—Citric acid, 10 parts, requires ammonium carbonate, about 7½ parts, magnesium carbonate, about 7 parts, potassium bicarbonate, about 14½ parts, and sodium bicarbonate, about 12 parts.

Dose.– 0·3 to 2 grammes (5 to 30 grains).

ACIDUM FORMICUM

(Acid. Form.)

Formic Acid

$CH_2O_2 = 46·02$

Formic acid, H·COOH, may be prepared by heating together glycerin and oxalic acid, or from the sodium formate produced by the action of carbon monoxide on sodium hydroxide or soda lime. It is a colourless liquid with a pungent odour and has a specific gravity of about 1·06. When warmed with solution of mercuric chloride, a white precipitate of mercurous chloride is formed. When dropped on cold concentrated sulphuric acid, carbon monoxide is evolved. Concentrated acids are also obtainable, containing about 50 per cent. and 85 to 90 per cent. of CH_2O_2; they are caustic liquids, which when applied to the skin cause painful burns.

Miscible in all proportions with water and alcohol.

Standard.—Formic acid contains not less than 24 per cent. and not more than 26 per cent. w/w of H·COOH. Residue on evaporation on a

water-bath, not more than 0·01 per cent. 1 millilitre complies with the limit test for chlorides and with the limit test for sulphates. When neutralised with solution of sodium hydroxide no pungent or tarry odour develops (absence of acrolein and allyl formate). When 1 millilitre of the acid is mixed with 20 millilitres of water, heated on a water-bath with 6 grammes of yellow mercuric oxide for about fifteen minutes, shaking frequently, and the liquid filtered, the filtrate is not acid to litmus (limit of acetic acid).

Assay.—Dilute about 1 gramme, accurately weighed, to 100 millilitres with water. Take 20 millilitres of the solution and proceed as directed under Calcii Formas; each millilitre of N/10 potassium permanganate is equivalent to 0·002301 gramme of CH_2O_2.

Action and Uses.—Formic acid resembles acetic acid in its action, but is more irritating and pungent. About one half of the formic acid taken internally is oxidised by the liver; the remainder is excreted as formates in the urine. The acid and its salts are employed internally as diuretics, and also in convalescence and debilitated conditions, and in cardiac weakness and muscular rheumatism, but there is lack of reliable evidence to show that they exert a tonic action upon muscle tissue. In cases of muscular rheumatism, formic acid and the formates have been injected intramuscularly, preceded by a small quantity of cocaine to alleviate the pain. The concentrated acid has been used with sodium bicarbonate in the preparation of an effervescent medicinal bath. Formic acid may be **administered** internally well diluted with water or alkaline aerated water, or as alkali formates.

Dose.– 0·12 to 0·6 millilitre (2 to 10 minims).

Preparation

Syrupus Glycerophosphatum cum Formatibus, B.P.C.—(Syr. Glycerophosph. c. Format.)—Syrup of Glycerophosphates with Formates. *Syn.*—Compound Elixir of Glycerophosphates with Formates. Each fluid drachm contains $\frac{1}{60}$ grain of strychnine, about 1 grain of calcium glycerophosphate, $\frac{1}{2}$ grain each of potassium, sodium and magnesium glycerophosphates, $\frac{1}{4}$ grain of iron glycerophosphate and 3 grains each of potassium and sodium formates. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

ACIDUM GALLICUM

(Acid. Gall.)

Gallic Acid

$C_7H_6O_5,H_2O = 188·1$

Gallic acid is 3:4:5-trihydroxybenzoic acid, $C_6H_2(OH)_3·COOH,H_2O$, and is usually prepared by the hydrolysis of tannic acid. It occurs in white or pale brown, odourless, silky needles or prisms. Solutions reduce ammoniacal silver nitrate solution and give a white precipitate with potassium antimonyltartrate solution.

Soluble in water (1 in 100), boiling water (1 in 3), alcohol (1 in 8) and glycerin (1 in 10).

Standard.—Gallic acid loses, on drying at 100°, not more than 10 per cent. of its weight. Ash, not more than 0·1 per cent. A solution of 1 part of the acid in 20 parts of water is not more than faintly yellow, and gives no precipitate with albumen solution or gelatin solution (absence of tannic acid).

Action and Uses.—Gallic acid does not exert a local astringent action similar to that of tannic acid. It is absorbed and excreted as sodium gallate, but some of it is oxidised in the tissues. There is little evidence to justify its use in albuminuria, diabetes and the night-sweats of phthisis, or as a remote astringent in cases of internal hæmorrhage, for which purposes it has been employed. It is generally **administered** in mixture form, when it should be finely powdered and diffused without the aid of a suspending agent. It may also be given in cachets, powders, or pills (massed with about one-tenth of its weight of glycerin). Gallic acid is applied locally in the form of ointment. It is **incompatible** with preparations of ethyl nitrite and salts of iron.

Dose.—0·3 to 1 gramme (5 to 15 grains).

Preparation

Glycerinum Acidi Gallici, B.P.C.—(Glycer. Acid. Gall.)—Glycerin of Gallic Acid. About 1 in 6½ w/w. Dose.– 0 6 to 4 millilitres (10 to 60 minims).

ACIDUM GLYCEROPHOSPHORICUM

(Acid. Glycerophosph.)

Glycerophosphoric Acid

$C_3H_9O_6P = 172·1$

Synonyms—Glycerylphosphoric Acid; Monoglycerylphosphoric Acid.

Glycerophosphoric acid may be prepared by heating glycerin with phosphoric acid *in vacuo*. It occurs as a clear, colourless, odourless liquid, having an acid taste and containing about 20 per cent. w/w of $C_3H_5(OH)_2O·PO(OH)_2$. It is a mixture of the isomeric α and β modifications; the proportions in which these two monoglycerides are present depend upon the method employed in its preparation; generally the chief constituent is the α variety, the salts of which are more soluble than those of the β acid. When heated with water, glycerophosphoric acid is decomposed into glycerin and phosphoric acid. It is used chiefly in the form of its salts, calcium and sodium glycerophosphates being the more important. Stronger solutions of the acid, namely, 25 per cent. (specific gravity, about 1·13) and 50 per cent. (specific gravity, about 1·30) are also obtainable.

Miscible in all proportions with water and alcohol.

Standard.—Glycerophosphoric acid contains not less than 19 and

not more than 21 per cent. w/w of $C_3H_9O_6P$. Specific gravity, 1·095 to 1·105. Arsenic limit, 2·5 parts per million. Lead limit, 10 parts per million. Dilute 2 millilitres with 50 millilitres of water and add 5 millilitres of dilute sulphuric acid; the mixture, after standing for thirty minutes, shows no turbidity (limit of barium). Neutralise 5 grammes with sodium hydroxide solution and mix thoroughly in a stoppered cylinder with 20 millilitres of dehydrated alcohol, add 5 grammes of recently ignited calcium sulphate, shake until the supernatant liquid is practically clear, filter into a 100 millilitre beaker, wash the residue in the cylinder with a few millilitres of dehydrated alcohol, evaporate the filtrate and washings, dry the residue at 70° for one hour and weigh; the residue weighs not more than 0·1 gramme (limit of free glycerin). Limit of combined alkali (calculated as Na_2O), 0·4 per cent.; limit of free phosphate (calculated as P_2O_5), 0·5 per cent.

Assay.—Dilute 5 grammes with a little water and titrate with N/1 sodium hydroxide, using bromocresol green as indicator; repeat the titration on another 5 grammes using thymol blue as indicator. When the titration with thymol blue is greater than twice the titration with bromocresol green, the difference gives the combined alkali present; each millilitre of N/1 sodium hydroxide is equivalent to 0·031 gramme of Na_2O. To the solution titrated to thymol blue add 40 millilitres of 30 per cent. w/v calcium chloride solution (neutral to thymol blue), boil for five minutes, cool and titrate with N/1 sodium hydroxide; the volume required represents the free phosphate present; each millilitre of N/1 sodium hydroxide is equivalent to 0·071 gramme of P_2O_5. The difference between the titrations with bromocresol green and thymol blue, after deducting the volume required for any free phosphate, represents the proportion of glycerophosphoric acid present; each millilitre of N/1 sodium hydroxide is equivalent to 0·17208 gramme of $C_3H_9O_6P$.

Action and Uses.—Glycerophosphoric acid and its salts were introduced into medicine on the supposition that they remedy a deficiency of phosphorus in the brain, especially in nervous diseases. This speculation is not supported by facts, since the phosphate in the compound can be recovered from the urine. The acid and its salts are supposed to act as nerve tonics and their use has been advocated in all kinds of nervous and wasting diseases. This supposition may have arisen from the fact that the acid can be prepared by hydrolysis of lecithin, which occurs in brain and nerve tissue generally, and has been described as exerting a beneficial action on growth. After absorption, the glycerophosphates slightly increase the metabolism of the body, like most inorganic salts. Compounds of casein with free glycerophosphoric acid may be **administered** in aqueous solution; but more generally the acid is given in combination with sodium, potassium, calcium, magnesium, iron, manganese or quinine. These salts, in various combinations and proportions, are prescribed in syrups and similar preparations and also in solution for intramuscular injection.

Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

Preparations

Caseinum Glycerophosphaticum, B.P.C.—(Casein. Glycerophosph.)—Glycerophosphated Casein. Soluble casein, with sodium and calcium glycerophosphates, of each, 1 in 40. Dose.– 4 to 16 grammes (1 to 4 drachms).

Emulsio Olei Morrhuæ cum Glycerophosphatibus, B.P.C.—(Emuls. Ol. Morrh. c. Glycerophosph.)—Emulsion of Cod-liver Oil with Glycerophosphates. It contains 50 per cent. v/v of cod-liver oil, with the glycerophosphates of calcium, magnesium, iron, sodium and potassium. Dose.– 8 to 30 millilitres ($\frac{1}{4}$ to 1 fluid ounce).

Emulsio Paraffini Liquidi cum Glycerophosphatibus, B.P.C.—(Emuls. Paraff. Liq. c. Glycerophosph.)—Emulsion of Liquid Paraffin with Glycerophosphates. *Syn.*—Emulsio Petrolei cum Glycerophosphatibus; Emulsion of Petroleum with Glycerophosphates. It contains 50 per cent. v/v of liquid paraffin with the glycerophosphates of calcium, magnesium, iron, sodium and potassium. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Malti Liquidum cum Glycerophosphatibus, B.P.C.—(Ext. Malt. Liq. c. Glycerophosph.)—Liquid Extract of Malt with Glycerophosphates. Each fluid drachm contains the equivalent of $\frac{1}{2}$ grain of potassium glycerophosphate and $\frac{1}{2}$ grain of sodium glycerophosphate in liquid extract of malt. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Glycerinum Glycerophosphatum Compositum, B.P.C.—(Glycer. Glycerophosph. Co.)—Compound Glycerin of Glycerophosphates. *Syn.*—Elixir Glycerophosphatum; Elixir of Glycerophosphates; Glycerol Glycerophosphatis. Each fluid drachm contains calcium glycerophosphate, $1\frac{1}{4}$ grains; potassium, sodium and magnesium glycerophosphates, of each, about $\frac{1}{2}$ grain; iron glycerophosphate, about $\frac{1}{4}$ grain; with glycerophosphoric acid, solution of bordeaux B orange-flower water, cherry-laurel water, glycerin and double chloroform water. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Glycerinum Glycerophosphatum cum Medulla Rubra, B.P.C.—(Glycer. Glycerophosph. c. Medull. Rub.)—Glycerin of Glycerophosphates with Red Bone Marrow. *Syn.*—Elixir Glycerophosphatum cum Medulla Rubra; Elixir of Glycerophosphates with Red Bone Marrow; Glycerol Glycerophosphatis cum Medulla Rubra. Equal parts of compound glycerin of glycerophosphates and extract of red bone marrow. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Syrupus Glycerophosphatum Compositus, B.P.C.—(Syr. Glycerophosph. Co.)—Compound Syrup of Glycerophosphates. *Syn.*—Syrupus Glycerophosphatum Ruber. Each fluid drachm contains $\frac{1}{60}$ grain of strychnine, $1\frac{1}{4}$ grains of calcium glycerophosphate, about $\frac{1}{2}$ grain each of potassium, sodium and magnesium glycerophosphates and about $\frac{1}{4}$ grain each of iron glycerophosphate and caffeine. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Syrupus Glycerophosphatum Compositus cum Medulla Rubra, B.P.C.—(Syr. Glycerophosph. Co. c. Medull. Rub.)—Compound Syrup of Glycerophosphates with Red Bone Marrow. Equal parts of compound syrup of glycerophosphates and extract of red bone marrow. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Syrupus Glycerophosphatum cum Formatibus, B.P.C.—(Syr. Glycerophosph. c. Format.)—Syrup of Glycerophosphates with Formates. *Syn.*—Compound Elixir of Glycerophosphates with Formates. Each fluid drachm contains $\frac{1}{60}$ grain of strychnine, about 1 grain of calcium glycerophosphate, $\frac{1}{2}$ grain each of potassium, sodium and magnesium glycerophosphates, $\frac{1}{4}$ grain of iron glycerophosphate and 3 grains each of potassium and sodium formates. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Syrupus Glycerophosphatum et Pepsini Compositus, B.P.C.—(Syr. Glycerophosph. et Pepsin. Co.)—Compound Syrup of Glycerophosphates and Pepsin. *Syn.*—Syrupus Glycerophosphatum Compositus (Robin). Each fluid drachm contains $1\frac{1}{4}$ grains of calcium glycerophosphate, about $\frac{1}{2}$ grain each of pepsin and of magnesium, sodium and potassium glycerophosphates, and about $\frac{1}{4}$ grain

of iron glycerophosphate, with caffeine and tincture of ignatia. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Syrupus Glycerophosphatum Flavus, B.P.C.—(Syr. Glycerophosph. Flav.)—Yellow Syrup of Glycerophosphates. It is of the same strength as compound syrup of glycerophosphates, but contains no strychnine and is coloured yellow. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

ACIDUM HYDRIODICUM DILUTUM

(Acid. Hydriod. Dil.)

Dilute Hydriodic Acid

HI = 127·9

Dilute hydriodic acid may be obtained by the action of hydrogen sulphide on a solution of iodine, or by the action of phosphorus on iodine in the presence of water in an atmosphere of carbon dioxide, and subsequent dilution. It is a clear, colourless, odourless liquid with an acid taste and contains about 10 per cent. w/w of HI with 1 per cent. w/w of hypophosphorous acid, added to prevent discolouration on keeping. It should be **stored** in small, well-filled, amber-coloured, glass-stoppered bottles protected from light. Hydriodic acids of greater concentrations can be obtained, including a constant boiling acid containing approximately 57 per cent. w/w of HI and boiling at 125°.

Standard.—Dilute hydriodic acid contains not less than 9·8 per cent. and not more than 10·2 per cent. w/w of HI. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. 5 millilitres complies with the limit test for sulphates. To 10 millilitres add 1 millilitre of dilute sulphuric acid; no turbidity is produced within five minutes (limit of barium).

Assay.—Dilute about 5 grammes, accurately weighed, with water, add an excess of N/10 silver nitrate, 5 millilitres of nitric acid and 0·5 millilitre of ferric ammonium sulphate solution; titrate with N/10 ammonium thiocyanate until a permanent pink colour is produced; each millilitre of N/10 silver nitrate is equivalent to 0·01279 gramme of HI.,

Action and Uses.—Dilute hydriodic acid has the general properties of iodine in weak combination. It is administered chiefly in the form of Syrupus Acidi Hydriodici when the alkali iodides are unsuitable, and is specially suitable for children. It is **incompatible** with alkalis and oxidising agents.

Dose.– 0·3 to 0·6 millilitre (5 to 10 minims), well diluted.

Preparation.

Syrupus Acidi Hydriodici, B.P.C.—(Syr. Acid. Hydriod.)—Syrup of Hydriodic Acid. Dilute hydriodic acid, 10 per cent. v/v, with distilled water and syrup. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This syrup was included in the British Pharmacopœia, 1914.

ACIDUM HYDROBROMICUM

(Acid. Hydrobrom.)

Hydrobromic Acid

HBr = 80·92

Hydrobromic acid may be prepared by the action of bromine on amorphous phosphorus in the presence of water, and distilling the hydrobromic acid at a moderate heat from the phosphorous acid thus formed. It occurs as a colourless or light straw-coloured liquid having a strong, acrid smell and contains about 34·5 per cent. w/w of hydrogen bromide. When 290 grammes is diluted with 710 grammes of water, a dilute acid containing approximately 10 per cent. w/w of HBr is obtained. Acids of the following strengths are also found in commerce:– 25 per cent. w/w of HBr equivalent to 30·2 per cent. w/v (specific gravity, 1·208), 30 per cent. w/w equivalent to 37·8 per cent. w/v (specific gravity, 1·260), 40 per cent. w/w equivalent to 55·0 per cent. w/v (specific gravity, 1·375). When hydrobromic acid is distilled it yields a constant boiling mixture containing approximately 49 per cent. w/w of hydrogen bromide and boiling at about 125°.

Standard.—Hydrobromic acid, determined by the method of the British Pharmacopœia for Acidum Hydrobromicum Dilutum, contains not less than 34 per cent. and not more than 35 per cent. w/w of HBr. Specific gravity, 1·303 to 1·314. When diluted as described above it yields a dilute acid which complies with the tests for purity for Acidum Hydrobromicum Dilutum.

Uses.—Concentrated hydrobromic acid may be employed for the preparation of Acidum Hydrobromicum Dilutum.

ACIDUM HYDROBROMICUM DILUTUM

(Acid. Hydrobrom. Dil.)

Dilute Hydrobromic Acid

HBr = 80·92

Dilute hydrobromic acid may be obtained by the interaction of bromine and sulphurous acid, or by the action of bromine on phosphorus in the presence of water, with subsequent distillation, or by distilling potassium bromide and phosphoric acid. It may be prepared by diluting Acidum Hydrobromicum with the requisite quantity of water (see Acidum Hydrobromicum). It occurs as a clear, colourless, odourless, acid liquid. Fothergill's hydrobromic acid, prepared by mixing aqueous solutions of potassium bromide and tartaric acid, contains less than 10 per cent. of hydrobromic acid with a small quantity of potassium acid tartrate. Dilute hydrobromic acid should be **stored** in amber-coloured, glass-stoppered bottles, and protected from light.

Standard, B.P.—Dilute hydrobromic acid contains not less than 9·8 per cent. and not more than 10·2 per cent. w/w of HBr. Specific gravity, 1·072 to 1·075. Residue on evaporation on a water-bath, not more than 0·01 per cent. w/w. Arsenic limit, 5 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for barium, sulphite, chloride and sulphate.

Action and Uses.—Dilute hydrobromic acid is said to be less depressing than the bromides, and to give rise to bromism less frequently; in reality it is a question of dosage, for the number of bromine ions contained in an average dose of hydrobromic acid is considerably smaller than that contained in an average dose of sodium or potassium bromide. The acid is sometimes given with quinine to prevent cinchonism, although its use for this purpose cannot be relied upon.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Preparation

Mistura Chloroformi Composita, B.P.C.—(Mist. Chlorof. Co.)—Compound Chloroform Mixture. *Syn.*—Mistura Tussi Sedativa; Mistura Tussi Rubra. Each fluid drachm contains 15 minims of dilute hydrobromic acid and $\frac{1}{20}$ grain of morphine hydrochloride with chloroform, solution of bordeaux B, cherry-laurel water, syrup of tolu and syrup. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ACIDUM HYDROCHLORICUM

(Acid. Hydrochlor.)

Hydrochloric Acid

HCl = 36·46

Hydrochloric acid may be prepared by saturating water with hydrogen chloride evolved by the action of sulphuric acid on sodium chloride. It occurs as a colourless, fuming liquid with a pungent odour. When distilled it yields a constant boiling mixture which boils at 110° and contains approximately 20 per cent. w/w of hydrogen chloride. Impure, commercial hydrochloric acid is popularly known as "spirits of salts" and also as muriatic acid.

Standard, B.P.—Hydrochloric acid contains not less than 31 per cent. and not more than 33 per cent. w/w of HCl. Specific gravity, 1·158 to 1·168. Residue on evaporation and gentle ignition, not more than 0·01 per cent. w/w. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for free chlorine, bromide, iodide, sulphite and sulphate.

Action and Uses.—Hydrochloric acid is a powerful caustic; it does not penetrate the tissues so deeply as does sulphuric or nitric acid, but produces a white eschar which afterwards sloughs. The strong acid is rarely used in therapeutics. Dilute hydrochloric acid in the mouth

induces a reflex flow of saliva and is thus of value in fevers and in other conditions where it is desired to allay thirst. It is used in those conditions in which there is commonly some deficiency of the normal hydrochloric acid of the gastric juice, such as cancer of the stomach and primary anæmias. In the duodenum the dilute acids induce the formation of secretin, a body which augments the flow of pancreatic juice. Hydrochloric acid is neutralised before absorption, and necessarily reduces the alkalinity of the tissues. There is an increase of ammonia nitrogen and a decrease of urea excreted in the urine. Applied to the skin dilute hydrochloric acid is a mild astringent.

Dilute hydrochloric acid is used in stomachic and digestive mixtures, cooling lotions and astringent gargles. In the treatment of achlorhydria associated with pernicious anæmia as much as 8 millilitres (2 fluid drachms) of dilute hydrochloric acid, well diluted with water, may be given. In cases of **poisoning** by hydrochloric acid, emetics and gastric lavage should not be used, but large draughts of water containing sodium bicarbonate, magnesia, chalk or soap, or preparations such as mixture of magnesium hydroxide or saccharated solution of calcium hydroxide should be given, followed by the usual methods of preventing collapse.

BETAINÆ HYDROCHLORIDUM.—Betaine hydrochloride is the hydrochloride of trimethyl glycocoll, a base occurring in sugar-beet and obtained from sugar-beet molasses. It occurs as a white crystalline substance readily soluble in water, giving a strongly acid solution, and is used for the administration of hydrochloric acid in a solid form. Dose.– 0·06 to 0·5 gramme (1 to 8 grains).

Preparation

Acidum Hydrochloricum Dilutum, B.P.—(Acid. Hydrochlor. Dil.)—Dilute Hydrochloric Acid. It contains 10 per cent. w/w of HCl (limits, 9·5 to 10 5). Specific gravity, 1·045 to 1·052. It complies also with the tests for purity under Acidum Hydrochloricum when three times the quantity is taken for each test. Dose.– 0·3 to 4 millilitres (5 to 60 minims).

ACIDUM HYDROCYANICUM DILUTUM

(Acid. Hydrocyan. Dil.)

Dilute Hydrocyanic Acid

Synonym—Dilute Prussic Acid.

Dilute hydrocyanic acid is an aqueous solution of hydrogen cyanide, HCN, which may be prepared by distilling potassium ferrocyanide with dilute sulphuric acid. It occurs as a colourless liquid, with a characteristic odour and a specific gravity of about 0·997. It should be **stored** in small, glass-stoppered bottles, inverted, in a cool place and protected from light.

Standard, B.P.—Dilute hydrocyanic acid contains not less than 1·9 per cent. and not more than 2·1 per cent. w/w of HCN. Residue on

evaporation, not more than 0·02 per cent. It complies also with a limit test for sulphate. Acidum Hydrocyanicum Dilutum I.A. contains 2 per cent. of hydrocyanic acid.

Action and Uses.—Dilute hydrocyanic acid is a powerful poison to all forms of living tissue. It is absorbed with great rapidity, and in lethal doses paralyses respiration and the heart. One of the first effects of the acid is to excite the medulla powerfully, especially the respiratory centre. Taken **internally** it is employed for its sedative action on the stomach in the vomiting of pregnancy, and other forms of vomiting. It is of doubtful value in the treatment of cough. On account of its depressing effect on sensory nerve endings it is used **externally** in dilute solution (about 1 in 20) for application to the unbroken skin to relieve irritation and itching in such conditions as lichen and urticaria.

In cases of **poisoning** by hydrocyanic acid, death generally occurs within one or two minutes, but, when this is not the case, artificial respiration should be resorted to, and the following mixture given as an antidote:—0·6 gramme (10 grains) of ferrous sulphate, 4 millilitres (1 fluid drachm) of solution of ferric chloride, and 30 millilitres (1 fluid ounce) of water, followed by 1·2 grammes (20 grains) of potassium carbonate, dissolved in 30 millilitres (1 fluid ounce) of water. Ammonia (inhaled and internally) and brandy should also be given as stimulants; atropine, $\frac{1}{60}$ grain, may be given hypodermically and 50 millilitres of a 20 per cent. solution of sodium thiosulphate intravenously may be tried. Intravenous injection of 50 millilitres of a 1 per cent. solution of methylene blue has been reported to be successful in some cases.

Dose.—0·12 to 0·3 millilitre (2 to 5 minims).

ACIDUM HYDROCYANICUM FORTIUS

(Acid. Hydrocyan. Fort.)

Stronger Hydrocyanic Acid

HCN = 27·02

Synonym—Scheele's Hydrocyanic (or Prussic) Acid.

Stronger hydrocyanic acid is an aqueous solution of hydrogen cyanide, containing approximately 4 per cent. w/w of HCN. It may be prepared by distilling potassium ferrocyanide with dilute sulphuric acid. It occurs as a colourless liquid with a characteristic odour. The vapour when inhaled is extremely poisonous. Specific gravity, about 0·994. The aqueous solution is unstable and slowly undergoes hydrolysis with formation of ammonium formate. It should be **stored** in a cool, dark place, in small, green or blue bottles, inverted, with well-fitting stoppers tied over with impervious tissue.

Standard.—Stronger hydrocyanic acid, determined by the method of the British Pharmacopœia for Acidum Hydrocyanicum Dilutum,

contains not less than 3·8 per cent. and not more than 4·2 per cent. w/w of HCN. When diluted with an equal volume of water it complies with the tests for purity for Acidum Hydrocyanicum Dilutum.

Uses.—Stronger hydrocyanic acid is employed chiefly for poisoning animals. It is seldom used in medicine except for the preparation of dilute hydrocyanic acid.

ACIDUM HYDROFLUORICUM

(Acid. Hydrofluor.)

Hydrofluoric Acid

HF = 20·01.

Synonym—Fluoric Acid.

Hydrofluoric acid may be prepared by the action of sulphuric acid on fluorspar. The gas produced is dissolved in water, and the solution adjusted to contain about 40 per cent. w/w of hydrogen fluoride. It occurs as a colourless, fuming liquid which attacks glass strongly. The crude acid contains sulphuric, sulphurous and fluosilicic acids; for use in medicine and as a chemical reagent the acid must be purified by redistillation. The constant boiling acid contains approximately 37 per cent. w/w of hydrogen fluoride and boils at 120°. Crude hydrofluoric acid of various strengths up to 55 per cent. is prepared for technical purposes. Hydrofluoric acid should be **stored** in gutta-percha or vulcanite bottles, or preferably in bottles coated internally with ceresin or hard paraffin.

Action and Uses.—Hydrofluoric acid and the alkali fluorides are powerful antiseptics. When taken internally, hydrofluoric acid is absorbed in the merest traces only; it causes death by shock following acute gastro-enteritis. The fluorides of sodium and ammonium have been employed internally in goitre, phthisis, and enlarged spleen, but their value is extremely doubtful. Unless well diluted, when taken internally the acid exerts an extremely powerful local irritant effect, and may destroy the mucous membrane. For internal **administration** Acidum Hydrofluoricum Dilutum containing about 0·5 per cent. of the strong acid in distilled water may be given in doses of 0·3 to 1 millilitre (5 to 15 minims), well diluted. The strong acid diluted five times has been used as an inhalation in phthisis; the eyes should be well protected from the vapour. Hydrofluoric acid is an extremely powerful corrosive. The greatest care should be taken to prevent it from coming into contact with the skin, since it may produce exceedingly painful and slow-healing sores after even a momentary contact. Burns produced by hydrofluoric acid may be treated by baths of ammonium carbonate or sodium carbonate.

ACIDUM HYPOPHOSPHOROSUM

(Acid. Hypophosph.)

Hypophosphorous Acid

$H_3PO_2 = 66{\cdot}04$

Hypophosphorous acid may be prepared by dissolving barium hypophosphite in hot distilled water and slowly adding dilute sulphuric acid, continuing the addition of acid, drop by drop, until no further turbidity is produced. The mixture is set aside in a warm place for one hour, filtered, the precipitate washed with hot water until the washings have no longer an acid reaction, and the filtrate evaporated on a water-bath until its specific gravity is about 1·14. It occurs as a colourless, odourless, acid liquid and contains about 31 per cent. w/w of H_3PO_2. The acid is monobasic. Solutions yield with mercuric chloride solution a white precipitate which becomes grey on adding excess of the acid; with copper sulphate solution a red precipitate of cuprous hydride is produced. When 323 grammes is diluted with 677 grammes of water, a dilute acid containing approximately 10 per cent. w/w of H_3PO_2 is obtained.

Standard.—Hypophosphorous acid, determined by the method of the British Pharmacopœia for Acidum Hypophosphorosum Dilutum, contains not less than 30 per cent. and not more than 32 per cent. w/w of H_3PO_2. When diluted with water as described above it yields a dilute acid which complies with the tests for purity for Acidum Hypophosphorosum Dilutum.

Uses.—Hypophosphorous acid may be employed for the preparation of Acidum Hypophosphorosum Dilutum.

ACIDUM HYPOPHOSPHOROSUM DILUTUM

(Acid. Hypophosph. Dil.)

Dilute Hypophosphorous Acid

$H_3PO_2 = 66{\cdot}04$

Dilute hypophosphorous acid may be obtained by treating barium hypophosphite with dilute sulphuric acid or by diluting Acidum Hypophosphorosum with the requisite amount of water (see Acidum Hypophosphorosum). It occurs as a clear, colourless, odourless, acid liquid, miscible with water and with alcohol, and yields the reactions described under hypophosphorous acid.

Standard, B.P.—Dilute hypophosphorous acid contains not less than 9·8 per cent. and not more than 10·2 per cent. w/w of H_3PO_2. Specific gravity, 1·040 to 1·042. Arsenic limit, 2 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for barium, phosphoric and oxalic acids, chloride, sulphate and iron.

Action and Uses.—Hypophosphorous acid is rapidly absorbed after neutralisation and the whole of the quantity administered can be recovered from the urine. It is **administered** usually in the form of its salts. It has been asserted that hypophosphorous acid exerts an action on nutrition resembling that of phosphorus, and its salts are therefore sometimes prescribed in wasting diseases such as phthisis. There is no pharmacological evidence to show that they behave differently from other inorganic salts, and any benefit derived is ascribed to the iron or calcium with which the acid may be combined. Hypophosphorous acid is employed in the preparation of syrup of ferrous iodide to prevent oxidation.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Preparations

Emulsio Olei Morrhuæ cum Hypophosphitibus, B.P.C.—(Emuls. Ol. Morrh. c. Hypophosph.)—Emulsion of Cod-liver Oil with Hypophosphites. *Syn.*—Emulsio Olei Morrhuæ Composita; Compound Emulsion of Cod-liver Oil. It contains 50 per cent. v/v of cod-liver oil with 1 grain each of the hypophosphites of calcium and sodium in each fluid drachm. Dose.– 8 to 30 millilitres (½ to 1 fluid ounce).

Emulsio Paraffini Liquidi cum Hypophosphitibus, B.P.C.—(Emuls. Paraff. Liq. c. Hypophosph.)—Emulsion of Liquid Paraffin with Hypophosphites. *Syn.*—Emulsio Petrolei cum Hypophosphitibus; Emulsion of Petroleum with Hypophosphites. It contains 50 per cent. v/v of liquid paraffin with 1 grain each of the hypophosphites of calcium and sodium in each fluid drachm. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Malti Liquidum cum Hypophosphitibus, B.P.C.—(Ext. Malt. Liq. c. Hypophosph.)—Liquid Extract of Malt with Hypophosphites. Each fluid drachm contains ¼ grain each of the hypophosphites of calcium and sodium in liquid extract of malt. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Glycerinum Hypophosphitum Compositum, B.P.C.—(Glycer. Hypophosph. Co.)—Compound Glycerin of Hypophosphites. *Syn.*—Glycerol Hypophosphitis. Each fluid drachm contains calcium hypophosphite and potassium hypophosphite, of each, about 1 grain; manganese hypophosphite and quinine (as hypophosphite), of each, about ½ grain; strychnine (as hypophosphite), about $\frac{1}{60}$ grain; with solution of ferric hypophosphite, hypophosphorous acid, distilled water and glycerin. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Syrupus Hypophosphitum Compositus, B.P.C.—(Syr. Hypophosph. Co.)—Compound Syrup of Hypophosphites. *Syn.*—Syrupus Ferri Hypophosphitis Compositus; Compound Syrup of Iron Hypophosphite. Each fluid drachm contains $\frac{1}{180}$ grain of strychnine, ⅛ grain of quinine, ½ grain of calcium hypophosphite and ¼ grain each of manganese and potassium hypophosphites. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Syrupus Triplex, B.P.C.—(Syr. Trip.)—Triple Syrup. Equal parts of compound syrup of ferrous phosphate, compound syrup of hypophosphites and syrup of ferrous phosphate with quinine and strychnine. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tabellæ Hypophosphitum Compositæ, B.P.C.—(Tab. Hypophosph. Co.)—Compound Tablets of Hypophosphites. Each tablet contains the hypophosphites of calcium, manganese, potassium, iron and quinine, and strychnine, and is equivalent to 1 fluid drachm of compound syrup of hypophosphites. Dose.– 1 or 2 tablets.

Tabellæ Phosphatum et Hypophosphitum Compositæ, B.P.C.—(Tab. Phosph. et Hypophosph. Co.)—Compound Tablets of Phosphates and Hypophosphites. *Syn.*—Triple Syrup Tablets. Each tablet contains saccharated iron phosphate, calcium, potassium and sodium phosphates, calcium, manganese, potassium and iron hypophosphites, strychnine and quinine sulphate, and is equivalent to 1 fluid drachm of a mixture of equal volumes of compound syrup of hypophosphites, compound syrup of ferrous phosphate and syrup of ferrous phosphate with quinine and strychnine. Dose.– 1 tablet.

ACIDUM LACTICUM

(Acid. Lact.)

Lactic Acid

$C_3H_6O_3 = 90{\cdot}05$

Lactic acid may be obtained by the lactic fermentation of sugar, and consists of a mixture of lactic acid, $CH_3{\cdot}CH(OH){\cdot}COOH$, and lactide, $C_6H_8O_4$. It occurs as a colourless, syrupy, hygroscopic liquid with a strongly acid reaction and a sour taste; it is odourless or may sometimes possess a slight, but not unpleasant, odour. When warmed with one tenth of its weight of potassium permanganate, acetaldehyde is evolved.

Miscible in all proportions with water, alcohol (90 per cent.) and ether; almost insoluble in chloroform.

Standard, B.P.—Lactic acid contains the equivalent of not less than 87·5 per cent. w/w of $C_3H_6O_3$. Specific gravity, about 1·21. Ash, not more than 0·1 per cent. w/w. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for various sugars, chloride, sulphate and iron.

Action and Uses.—Lactic acid is **administered** in mixtures in the form of the dilute acid, often with iron and calcium lactates, in the treatment of atonic dyspepsia. It is employed as a caustic to destroy tuberculous ulcerations of the pharynx and larynx and also as a local application to lupus and to diphtheritic membranes (1 in 15). A 1 in 3 dilution has been recommended as an application in alopecia. Nascent lactic acid has also been employed as an intestinal antiseptic. For this purpose living lactic acid-forming bacilli are ingested with suitable material for their growth and multiplication (see Lac Coactum).

In the preparation of acidified milk, lactic acid is added to whole milk in the proportion of from 45 to 60 minims to the pint. The acid should be added drop by drop to cold milk, stirring vigorously to prevent the formation of large curds. A fine flocculent curd results which will flow through an ordinary rubber teat. Sugar or honey is now added. After the addition of the acid, the milk must not be boiled or unduly heated or thick clots will form. This method is now considered by many to be the best routine procedure if the breast is not available. The procedure can also be adopted in the case of dried

milk, either full-cream or half-cream. A 10 per cent. dilution of lactic acid is used as a vaginal douche in leucorrhœa. Lactic acid, 1 to 2 per cent., in the form of jelly or pessaries in combination with boric acid is employed as a contraceptive.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

ÆTHYLIS LACTAS.—Ethyl lactate, $CH_3{\cdot}CH(OH){\cdot}COOC_2H_5$, may be prepared by the esterification of lactic acid. The pure substance is a colourless and almost odourless liquid, but the commercial variety usually has a somewhat disagreeable odour. It has a specific gravity of 1·03 to 1·04, and a boiling-range of about 135° to 160°. It is miscible with water and with aromatic hydrocarbons and is used as a solvent in the manufacture of lacquers and varnishes.

Preparations

Acidum Lacticum Dilutum, B.P.C.—(Acid. Lact. Dil.)—Dilute Lactic Acid. It contains about 15 per cent. v/v of lactic acid. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Syrupus Acidi Lactici, B.P.C.—(Syr. Acid. Lact.)—Syrup of Lactic Acid. Lactic acid, 2·5 per cent. v/v, in syrup. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

ACIDUM NITRICUM

(Acid. Nit.)

Nitric Acid

$HNO_3 = 63{\cdot}02$

Nitric acid may be obtained by the distillation of sodium nitrate with sulphuric acid. It occurs as a clear, colourless, or almost colourless, liquid which evolves corrosive fumes and boils at 121°. Other strengths of nitric acid are also obtainable in commerce. Fuming nitric acid has a specific gravity of 1·5 and contains about 94 per cent. w/w of HNO_3; it is usually of a reddish-brown colour owing to the presence of dissolved oxides. Aqua Regia is a mixture of concentrated hydrochloric and nitric acids.

Standard, B.P.—Nitric acid contains not less than 69 and not more than 71 per cent. w/w of HNO_3. Specific gravity, about 1·42. Residue on evaporation and gentle ignition, not more than 0·01 per cent. w/w. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for copper, zinc, iron, chloride and sulphate.

Action and Uses.—Nitric acid is a powerful caustic owing to its oxidising power and its coagulating effect upon albumin. The coagulated albumin is insoluble in excess of the acid, and for this reason its caustic action is localised to some extent; it forms a convenient means of removing warts, but should be used with caution. Nitric acid is **administered** as Acidum Nitricum Dilutum in mixtures with vegetable bitters for gastric indigestion and stomatitis; it is prescribed as an astringent, often with opium, for some forms of diarrhœa.

Externally, the dilute acid may be employed further diluted (1 in 10) to relieve itching in lichen, prurigo, etc., and has an action similar to other dilute acids.

In cases of **poisoning** by nitric acid, large draughts of soap and water should be taken at once with calcium or magnesium hydroxide, well diluted; shock should be treated in the usual way. The fumes of nitric acid are irritating and corrosive to the respiratory passages; they may cause severe symptoms reflexly from the nasal and bronchial mucous membranes, such as spasm of the larynx, bronchiolar constriction, and slowing or temporary cessation of the heart beat. In case of exposure to the fumes, a wet cloth should be applied over the mouth and nostrils. Burns from nitric acid should be treated immediately with sodium bicarbonate, and subsequently with oil applied on lint, and covered with cotton wool.

Preparations

Acidum Nitricum Dilutum, B.P.C.—(Acid. Nit. Dil.)—Dilute Nitric Acid. It contains from 9·5 to 10·5 per cent. w/w of HNO_3. Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

This dilute acid was included in the British Pharmacopœia, 1914.

Acidum Nitro-Hydrochloricum Dilutum, B.P.C.—(Acid. Nitro-hydrochlor. Dil.)—Dilute Nitro-hydrochloric Acid. It contains nitric and hydrochloric acids and various reaction products of the constituent acids, equivalent to about 12·5 per cent. w/w of nitric acid and about 13·5 per cent. w/w of hydrochloric acid. Dose.– 0·3 to 1·2 millilitres (5 to 20 minims)

This dilute acid was included in the British Pharmacopœia, 1914.

Mistura Gentianæ Acida, B.P.C.—(Mist. Gent. Acid.)—Acid Mixture of Gentian. Each fluid ounce contains 12 minims of dilute nitro-hydrochloric acid, with syrup of orange, compound infusion of gentian and chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

ACIDUM NUCLEICUM

(Acid. Nucleic.)

Nucleic Acid

Synonym—Nucleinic Acid.

The nucleic acids are complex organic acids of varying composition containing phosphorus in combination with varying amounts of protein, and occur as constituents of the nuclei of cellular organs both of animals and plants. These protein combinations of nucleic acids are known as nucleo-proteins and from them, by digestion with pepsin and hydrochloric acid, the greater part of the protein is removed, the undecomposed residue being known as nuclein, a term erroneously used as a synonym for nucleic acid. On hydrolysis of nuclein by pancreatin, or better by means of dilute alkalis, nucleic acids are obtained.

Nucleic acid prepared from yeast is most commonly employed. It occurs as a greyish-white or yellowish-white amorphous powder. It is acid to litmus, liberates carbon dioxide from carbonates and forms

salts with metals. Nucleic acid is gradually decomposed by boiling with dilute acids, or by prolonged heating with water, but is resistant to alkalis, especially in the presence of alkali acetates. On hydrolysis it yields, firstly, a mixture of compounds known as nucleotides, which are combinations of pyrimidine or purine groupings with a sugar and phosphoric acid; secondly, phosphoric acid is split off and nucleosides, compounds formed of pyrimidine or purine groupings with a sugar, are obtained, and finally, these are split up into the constituent pyrimidine or purine and a sugar. Nucleic acid contains about 13 per cent. of nitrogen and about 7 per cent. of phosphorus.

Insoluble in alcohol and ether, practically insoluble in water and dilute acids; soluble in dilute alkalis and in potassium acetate solution.

Action and Uses.—Nucleic acid is credited with some power to neutralise toxins present in the blood. In cases of tuberculosis it produces a reaction similar to that of tuberculin. Given by injection, it increases the number of white blood corpuscles. This effect is preceded by a hypoleucocytosis lasting some three or four hours; the leucocytes then leave their normal situations and come out in rapidly increasing numbers into the free circulation. It has been suggested, but on no definite evidence, that it may act as an indirect bactericide in tuberculosis, endocarditis, septicæmia and other bacterial infections. Nucleic acid is also given to heal chronic and varicose ulcers. Nucleic acid is **administered** internally in pills, cachets or tablets. It is best taken with or immediately following a meal.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

ACIDUM THYMINICUM.—Thyminic acid, or nucleotin-phosphoric acid, occurs as a yellowish-brown amorphous powder. It is soluble in water and the solution is slightly acid. Thyminic acid is a uric acid solvent said to be capable of holding in solution practically its own weight of uric acid at 20° and one and a half times its weight at blood temperature; on this evidence, it has been prescribed in the treatment of gout. Dose.– 0·25 to 0·4 gramme (4 to 6 grains).

SODII NUCLEAS.—A 5 per cent. solution of sodium nucleate, prepared from nucleic acid with sufficient sodium hydroxide to produce a solution neutral in reaction to litmus, is used orally and by hypodermic injection; for hypodermic injection, 0·5 per cent. of phenol or chlorbutol is added. The solution is sometimes used in combination with sodium cacodylate and strychnine. An intramuscular injection is employed in the treatment of lobar pneumonia. Solutions for injection may be sterilised by tyndallisation at 70° for one hour on three successive days, by filtration, or when required in an emergency, by boiling the solution at 100° for thirty minutes. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms) of solution, by the mouth; 1 to 2 millilitres (¼ to ½ fluid drachm), by injection.

ACIDUM OLEICUM

(Acid. Oleic.)

Oleic Acid

Oleic acid may be obtained by the hydrolysis of fats or fixed oils, or by treating commercial oleins with superheated steam. The liquid

consists chiefly of $C_{17}H_{33}\cdot COOH$, but also contains some stearic and palmitic acids and usually traces of iron, probably derived from the vessels in which it is stored. It occurs as a colourless or yellowish, oily liquid having a slightly acid reaction and possessing a characteristic tallow-like odour and taste; on exposure to air the liquid darkens and the odour and taste become more pronounced. The solid or semi-solid mass obtained after cooling to about 4° remelts at about 14°. On the addition of 1 part of dilute sulphuric acid to a mixture of 1 part of oleic acid and 3 parts of a saturated aqueous solution of sodium nitrite, the oleic acid is converted after standing for a few hours into the solid stereoisomeride, elaidic acid.

Insoluble in water; readily soluble in alcohol (90 per cent.), ether chloroform, benzene and light petroleum.

Standard, B.P.—Oleic acid has a specific gravity of about 0·898. Acid value, 195 to 200. Iodine value, 85 to 90. Ash, not more than 0·1 per cent. w/w. It complies also with limit tests for stearic acid, mineral acids, neutral fats and mineral oils.

Action and Uses.—Oleic acid has been used internally in the treatment of gall-stones. Externally, it is used to assist the absorption of medicaments combined with it, such as alkaloids and mercury. It should not be used in the preparation of eye ointments.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

ACIDUM OXALICUM

(Acid. Oxal.)

Oxalic Acid

$C_2H_2O_4,2H_2O = 126·0$

Oxalic acid, $(COOH)_2,2H_2O$, may be prepared by heating sawdust with potassium or sodium hydroxide, or by heating sodium formate, with subsequent liberation of the acid and purification by recrystallisation. It occurs in large, colourless, transparent, monoclinic crystals, which effloresce in the air. By taking special precautions it can be made to melt between 98° and 100°. The anhydrous acid volatilises, with partial decomposition, at a temperature of about 150°. The commercial product may contain as impurities the sulphates of sodium, potassium, calcium and lead, and extraneous organic matter. When to a solution of oxalic acid solution of calcium chloride and acetic acid are added, a minutely crystalline precipitate is produced which, on filtering and washing, decolourises potassium permanganate solution when mixed with dilute sulphuric acid and heated to 60°.

Soluble in water (1 in 12); less soluble in alcohol; sparingly soluble in ether; insoluble in chloroform, benzene and light petroleum.

Action and Uses.—Oxalic acid is poisonous to all forms of animal and plant life. In mammals it causes death by paralysis of the central

nervous system. The acid and the oxalates are rapidly absorbed from the gastro-intestinal tract and precipitate ionisable calcium from the blood and tissues; this property is utilised in the laboratory for preventing the clotting of samples of blood. The action of the oxalates can probably be attributed to the withdrawal of ionisable calcium from the tissues. Oxalic acid is used principally for technical purposes, and the purified acid as a laboratory reagent.

The antidote in cases of **poisoning** by oxalic acid is calcium hydroxide or calcium carbonate mixed with water. Soluble alkalis and carbonates, magnesia and magnesium carbonate should not be given, neither should the stomach tube be used, nor emetics administered unless the case is treated immediately after ingestion of the poison; it is preferable to convert the acid into the insoluble calcium salt and to induce evacuation by means of castor oil or an enema.

ACIDUM PHOSPHORICUM

(Acid. Phosph.)

Phosphoric Acid

$H_3PO_4 = 98{\cdot}04$

Synonyms—Acidum Phosphoricum Concentratum; Concentrated Phosphoric Acid.

Phosphoric acid is orthophosphoric acid and may be obtained by the oxidation of phosphorus in contact with water. It is a stronger solution than the corresponding preparation of the British Pharmacopœia, 1914, which contained only 66·3 per cent w/w of H_3PO_4, and had a specific gravity of 1·5. Phosphoric acid occurs as a clear, colourless and odourless liquid of syrupy consistence and has a strongly acid reaction even when freely diluted. When heated, it loses water and is converted finally into metaphosphoric acid, HPO_3, which on cooling forms a transparent glassy mass known as glacial phosphoric acid; the commercial article contains usually a little sodium or ammonium metaphosphate added to facilitate its preparation in clear sticks or slabs.

Miscible in all proportions with water.

Standard, B.P.—Phosphoric acid contains not less than 88 and not more than 90 per cent. w/w of H_3PO_4. Specific gravity, about 1·75. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for calcium and aluminium, phosphorous and hypophosphorous acids, chloride, sulphate and iron.

Action and Uses.—Phosphoric acid has none of the therapeutic properties of free phosphorus. It is **administered** internally in the diluted form, when it may be prescribed in larger doses than the other dilute mineral acids without interfering with the digestive processes. It is used as a gastric stimulant and to quench thirst. For

increasing the acidity of the urine it is much inferior to sodium acid phosphate.

Preparations

Acidum Phosphoricum Dilutum, B.P.—(Acid. Phosph. Dil.)—Dilute Phosphoric Acid. It contains 10 per cent. w/w of H_3PO_4 (limits, 9·5 to 10·5). Specific gravity, 1·054 to 1·060. It complies also with the tests for purity under Acidum Phosphoricum when eight times the quantity is taken for each test. Dose.– 0·3 to 4 millilitres (5 to 60 minims).

Mistura Acidi Phosphorici, B.P.C.—(Mist. Acid. Phosph.)—Phosphoric Acid Mixture. Each fluid ounce contains 15 minims of dilute phosphoric acid with emulsion of chloroform, syrup of orange and compound infusion of gentian. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

ACIDUM SALICYLICUM

(Acid. Salicyl.)

Salicylic Acid

$C_7H_6O_3 = 138·0$

Salicylic acid is *o*-hydroxybenzoic acid, $C_6H_4(OH)·COOH$, and may be obtained from the sodium salt prepared by the action of carbon dioxide on sodium phenate. In addition to this synthetically prepared variety there is also obtainable in commerce a "natural" acid prepared by the hydrolysis of naturally occurring salicylates such as oil of sweet birch. The natural acid is free from impurities which formerly were present in the synthetic product and is still sometimes preferred for medicinal use. The purest variety of the synthetic product is sometimes described as "physiologically pure." Salicylic acid occurs as colourless crystals or as a light feathery powder; it is almost odourless and has a sweetish, acrid taste. A deep violet colour is given on the addition of ferric chloride solution to an aqueous or an alcoholic solution. Salicylic acid dissolves in solutions of ammonium citrate, ammonium acetate, sodium phosphate, potassium citrate, sodium citrate and borax.

Soluble in water (about 1 in 500), boiling water (1 in 9), alcohol (90 per cent.) (1 in 3·5), ether (1 in 2), glycerin (1 in 200) and chloroform.

Standard, B.P.—Salicylic acid contains not less than 99·5 per cent. of $C_7H_6O_3$. Melting-point, 158° to 159°. Ash, not more than 0·05 per cent. Arsenic limit, 2 parts per million. Lead limit, 5 parts per million. It complies also with a limit test for iron and colouring matter.

Action and Uses.—Salicylic acid is a powerful antiseptic; it exerts a strong inhibitory influence upon the growth of micro-organisms, and retards the action of unorganised ferments as well as the ferments responsible for alcoholic and acetic fermentation. Applied to wounds, it is less irritating than phenol, but strong solutions exert a destructive action upon the horny layer of the epidermis, which is softened and

may easily be removed. Swallowed in powder or tablets, salicylic acid may cause irritation and corrosion of the mucous membrane of the mouth, throat and stomach. For internal use it has been replaced, almost entirely, by sodium salicylate and acetylsalicylic acid, which resemble it in therapeutic action.

Salicylic acid is used **externally** as an antiseptic and antipruritic in the treatment of wounds and parasitic skin diseases; it is also employed as a mouth-wash and as a local application to diminish sweating, especially when offensive. In concentrated solutions it is employed to remove such epidermal thickenings as corns and warts, and to destroy lupus. A solution of 1 in 1000 is sufficiently strong to preserve alkaloidal and similar solutions. Its use as a preservative of food and beverages is prohibited by the Public Health (Preservatives, etc., in Food) Regulations, 1925. Salicylic acid is **incompatible** with iron salts and spirit of nitrous ether.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

ACIDUM SALICYLSULPHONICUM.—Salicylsulphonic acid, $C_6H_3(SO_3H)(OH)COOH$, occurs in small, colourless, needle-shaped crystals. It gives a deep violet colouration with ferric chloride solution. Salicylsulphonic acid is used as a reagent to detect albumin in urine; a few crystals added to the clear urine produce a turbidity, if albumin is present, which is not affected by heat; the precipitate due to albumoses or peptones is dissolved on heating, but reappears on cooling.

Preparations

Amylum Salicylatum, B.P.C.—(Amylum Salicylat.)—Salicylated Starch. Salicylic acid, 1 in 10, with starch.

Collodium Salicylicum, B.P.C.—(Collod. Salicyl.)—Salicylic Collodion. Salicylic acid, about 1 in 8, in acetone and acetone collodion.

Collodium Salicylicum Compositum, B.P.C.—(Collod. Salicyl. Co.)—Compound Salicylic Collodion. *Syn.*—Collodium Callosum. Salicylic acid, about 1 in 8, and extract of cannabis, in acetone and acetone collodion.

Emplastrum Salicylicum Compositum, B.P.C.—(Emp. Salicyl. Co.)—Compound Salicylic Plaster. Salicylic acid, 1 in 5, and extract of cannabis, 1 in 10, with rubber adhesive plaster.

Emplastrum Salicylicum Compositum Fortius, B.P.C.—(Emp. Salicyl. Co. Fort.)—Stronger Compound Salicylic Plaster. Salicylic acid, 1 in 2½, and extract of cannabis, 1 in 5, with rubber adhesive plaster.

Emplastrum Salicylicum Elasticum, B.P.C.—(Emp. Salicyl. Elast.)—Rubber Salicylic Plaster. Salicylic acid, 1 in 10, with rubber adhesive plaster. Rubber salicylic plasters are also prepared containing other proportions (from 5 to 40 per cent.) of salicylic acid.

Parogenum Salicylatum, B.P.C.—(Parogen. Salicylat.)—Salicylated Parogen. *Syn.*—Salicylated Vasoliment. Salicylic acid, 10 per cent. w/v, in parogen.

Pulvis Acidi Salicylici Compositus, B.P.C.—(Pulv. Acid. Salicyl. Co.)—Compound Salicylic Acid Powder. *Syn.*—Pulvis pro Pedibus. Salicylic acid 3 per cent., with boric acid and purified talc.

Pulvis Zinci et Acidi Salicylici, B.P.C.—(Pulv. Zinc. et Acid. Salicyl.)—Zinc and Salicylic Acid Powder. Zinc oxide, 20 per cent., and salicylic acid, 5 per cent., with starch.

Unguentum Acidi Salicylici, B.P.—(Ung. Acid. Salicyl.)—Ointment of Salicylic Acid. *Syn.*—Salicylic Acid Ointment. Salicylic acid, 2 per cent., in white paraffin ointment.

ACIDUM STEARICUM
(Acid. Stear.)

Stearic Acid

Stearic acid, sometimes incorrectly called "stearine," is a mixture of solid fatty acids, chiefly stearic and palmitic, obtained by the hydrolysis of various fats and subsequent removal of the liquid acids by cooling and filtration. It occurs in almost odourless and tasteless, white, hard masses, greasy to the touch and showing signs of crystallisation. Stearic acid may be powdered by sprinkling it with alcohol during trituration. Pure stearic acid, $C_{17}H_{35}\cdot COOH = 284{\cdot}3$, is obtained by crystallising the commercial substance from hot alcohol, precipitating the alcoholic solution with magnesium acetate and decomposing the magnesium stearate by boiling with water and hydrochloric acid; it occurs in white, shining, flaky crystals, or as a hard, somewhat glossy solid, melting at 69·3°.

Insoluble in water; soluble in alcohol (1 in 50); readily soluble in ether and chloroform.

Standard.—Stearic acid does not melt below 54°. Acid value, 200 to 210. The solution obtained by boiling 1 gramme of the acid with 0·5 gramme of sodium carbonate dissolved in 30 millilitres of water, is not more than opalescent (limit of neutral fat or paraffin). Ash, not more than 0·1 per cent.

Uses.—Stearic acid is sometimes used as a substitute for wax in ointments and in the form of a powder as a lubricant in making compressed tablets. When partly neutralised it forms a creamy base with 5 to 15 times its weight of aqueous liquid and, in this form, is sometimes used as the basis of "vanishing" creams. The proportion of alkali used largely determines the appearance and plasticity of the cream. In this form it is used as a protective for the skin and with the addition of quinine it protects against sunburn in light treatment. When fully saponified and dissolved by heat in glycerin or alcohol, it will solidify with at least ten times its weight of liquid when cold. This property is utilised in making glycerin suppositories and "solid" tincture of iodine.

Preparations

Pasta Acidi Stearici, B.P.C.—(Past. Acid. Stear.)—Stearic Acid Paste. *Syn.*—Unscented Vanishing Cream. A non-greasy cream containing partially saponified stearic acid.

Pasta Hamamelidis, B.P.C.—(Past. Hamam.)—Hamamelis Paste. *Syn.*—Witch Hazel Cream. A non-greasy stearate cream containing about 50 per cent. w/w of solution of hamamelis.

ACIDUM SUCCINICUM

(Acid. Succin.)

Succinic Acid

$C_4H_6O_4 = 118{\cdot}0$

Succinic acid, $(CH_2{\cdot}COOH)_2$, may be prepared by the destructive distillation of amber, or by the fermentation of tartaric acid or malic acid; it is also obtained as a by-product of the fermentation of sugar. It occurs in colourless crystals having an acid taste. A neutralised solution of the acid yields a cinnamon-brown precipitate with ferric chloride solution which, when washed, decomposed by boiling with solution of ammonia and filtered, gives a solution from which white barium succinate is precipitated by the addition of solution of barium chloride and an equal volume of alcohol.

Soluble in water (1 in 20), and in less than its weight of boiling water; soluble in alcohol (1 in 9); slightly soluble in ether; insoluble in chloroform.

Standard.—Succinic acid, determined by the method of the British Pharmacopœia for Acidum Tartaricum, contains not less than 99·5 per cent. of $C_4H_6O_4$; each millilitre of N/1 sodium hydroxide is equivalent to 0·05902 gramme of $C_4H_6O_4$. Melting-point, not lower than 185°. Ash, not more than 0·1 per cent.

Action and Uses.—Succinic acid is rarely used in medicine. When administered orally it is neutralised in the duodenum and the sodium succinate so formed exerts a saline cathartic action similar to that of the salts of tartaric acid. It is absorbed very slowly and that portion absorbed is completely oxidised in the tissues.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

AMMONII SUCCINAS.—Ammonium succinate, $C_4H_4O_4(NH_4)_2$, may be obtained by the interaction of ammonia and succinic acid. It occurs in colourless crystals, soluble in water and alcohol. Its action resembles that of other salines—mildly diuretic, expectorant and diaphoretic. Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

ASPARAGINUM.—Asparagin, $HOOC(NH_2)HC{\cdot}CH_2{\cdot}CONH_2,H_2O$, is the amide of aminosuccinic acid, and is found in the cell sap of plants. It forms colourless crystals, which are sweet in the case of *d*-asparagin, while *l*-asparagin has a disagreeable and cooling taste. It is soluble in water (1 in 50) and insoluble in alcohol. Asparagin has diuretic properties and has been given in cardiac dropsy, nephritis, and gout; it is, however, of doubtful physiological activity. Its solutions dissolve freshly precipitated mercuric oxide, and preparations of mercury aminosuccinamate have been used for hypodermic injection in syphilis. Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

ACIDUM SULPHANILICUM

(Acid. Sulphanil.)

Sulphanilic Acid

$C_6H_7O_3NS,2H_2O = 209{\cdot}2$

Sulphanilic acid, $C_6H_4(NH_2)SO_3H,2H_2O$, is *p*-aminobenzenesulph-

onic acid, and may be prepared by heating together aniline and sulphuric acid. It occurs in colourless, needle-shaped crystals, which effloresce on exposure to air. It shows no melting-point, but is decomposed on heating at 280° to 300°. A cold solution in dilute hydrochloric acid, to which a cold solution of sodium nitrite has been added, produces a red precipitate when added to a solution of betanaphthol in sodium hydroxide solution.

Soluble with difficulty in cold water (about 1 in 160), but more readily in hot water; insoluble in alcohol, ether and benzene.

Standard.—Sulphanilic acid yields not more than 0·1 per cent. of ash. 1 gramme in 25 millilitres of boiling water, boiled, cooled and filtered, complies with the limit test for chlorides. 1 gramme in 25 millilitres of boiling water, cooled and filtered, complies with the limit test for sulphates.

Action and Uses.—Sulphanilic acid was formerly recommended for use in the treatment of iodism on the supposition that this condition was due to the liberation of iodine by nitrites in the body, but it has been shown that the acid does not react with nitrites in the animal body and its use for this purpose has been abandoned. It has also been given orally in the treatment of coryza, catarrh and as an analgesic. The acid is a constituent of Ehrlich's diazo-test for typhoid fever, now superseded by the Widal reaction.

Dose.– 0·6 to 1·2 grammes (10 to 20 grains).

ZINCI SULPHANILAS.—Zinc sulphanilate, $(C_6H_6O_3NS)_2Zn,4H_2O$, may be prepared from sulphanilic acid and zinc oxide, and occurs in white, prismatic crystals, which effloresce slightly on exposure to the air. It is soluble in water (1 in 6), slightly soluble in alcohol, but insoluble in ether, chloroform and benzene. Sulphanilic acid is precipitated from its aqueous solution by sulphuric acid. The salt loses its water of crystallisation when dried at 100°. It is used as an astringent and antiseptic injection in leucorrhœa and gonorrhœa. In acute gonorrhœa it is used in dilute solutions (1 or 2 grains to 1 fluid ounce of water).

ACIDUM SULPHURICUM

(Acid. Sulph.)

Sulphuric Acid

$H_2SO_4 = 98·08$

Sulphuric acid may be obtained by dissolving the product of the oxidation of sulphur dioxide in water. It occurs as a colourless, corrosive liquid of oily consistence which evolves heat when added to water. Impure commercial sulphuric acid, known as concentrated oil of vitriol, "C.O.V.," contains about 98 per cent. w/w of H_2SO_4; brown oil of vitriol, "B.O.V.," contains 85 to 90 per cent. w/w of H_2SO_4. Battery or accumulator acid is pure sulphuric acid diluted with distilled water to a specific gravity ranging from 1·20 to 1·26. Nordhausen or fuming

sulphuric acid, known commercially as "oleum," is prepared by the addition of sulphur trioxide to sulphuric acid and can be obtained containing various proportions of SO_3; it was formerly obtained by the distillation of ferrous sulphate.

Standard, B.P.—Sulphuric acid contains not less than 95 per cent. w/w of H_2SO_4. Specific gravity, about 1·84. Ash, not more than 0·01 per cent. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for oxidisable impurities, nitrate, chloride and iron.

Action and Uses.—Sulphuric acid is a powerful escharotic, charring organic substances by virtue of its affinity for water. Applied to the skin, it causes intense pain and rapid destruction of tissue; it is even more irritating to mucous membrane. The concentrated acid is seldom employed in therapeutics, but was formerly used, mixed with sufficient charcoal to form a paste, as a caustic. It is **administered** as Acidum Sulphuricum Dilutum, which has an action similar to that of other dilute mineral acids. It is employed in the treatment of diarrhoea, its action being both antiseptic and astringent.

As a preventive of cholera epidemics, a drink colloquially known as "sulphuric acid lemonade," containing 5 to 10 minims of dilute sulphuric acid in a pint of sweetened water, has been found very efficacious. Aromatic sulphuric acid in the proportion of 5 to 20 minims to an ounce of sweetened water may be used instead. Dilute sulphuric acid is given in the treatment of lead colic; "sulphuric acid lemonade" is drunk by lead workers as a prophylactic of plumbism. Dilute sulphuric acid taken internally is said to be of value in obstinate cases of furunculosis. In cases of **poisoning** by sulphuric acid, the antidotes are calcium or magnesium hydroxide and water, or soap and water. The stomach pump and emetics should not be used. Opium and brandy are useful, and the usual means should be adopted against shock. Burns from sulphuric acid should be washed with water and treated with sodium bicarbonate, followed by oil, or sprayed with tannic acid solution.

Preparations

Acidum Sulphuricum Aromaticum, B.P.C.—(Acid. Sulph. Aromat.)—Aromatic Sulphuric Acid. *Syn.*—Elixir of Vitriol. It contains about 13 per cent. w/w of free and combined sulphuric acid, with tincture of ginger, spirit of cinnamon and alcohol (90 per cent.). Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

This aromatic acid was included in the British Pharmacopœia, 1914.

Acidum Sulphuricum Dilutum, B.P.—(Acid. Sulph. Dil.)—Dilute Sulphuric Acid. It contains 10 per cent. w/w of H_2SO_4 (limits, 9·5 to 10·5). Specific gravity, 1·064 to 1·073. It complies also with a limit test for nitrate and with the other tests for purity under Acidum Sulphuricum, when nine times the quantity is taken for each test. Dose.– 0·3 to 4 millilitres (5 to 60 minims).

Mistura Acidi Sulphurici cum Opio, B.P.C.—(Mist. Acid. Sulph. c. Opio)—Sulphuric Acid Mixture with Opium. Each fluid ounce contains 20 minims of dilute sulphuric acid and 7½ minims of tincture of opium with tincture of capsicum and camphor water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

ACIDUM SULPHUROSUM

(Acid. Sulphuros.)

Sulphurous Acid

$H_2SO_3 = 82{\cdot}08$

Sulphurous acid may be prepared by dissolving in water the gas obtained from liquefied sulphur dioxide, or by burning sulphur in air and passing the resulting sulphur dioxide into water. It occurs as a colourless liquid with a characteristic, suffocating odour. Its specific gravity is about 1·025. It is never free from traces of sulphates, and owing to the ease with which it becomes oxidised, it should be **stored** in completely-filled, stoppered bottles in a cool, dark place. Liquid sulphur dioxide is obtainable in siphons; it is a colourless, mobile liquid, boiling at about −8° and having a specific gravity of about 1·5.

Standard.—Sulphurous acid contains not less than 4·5 per cent. and not more than 5·5 per cent. w/w of SO_2, corresponding to from 5·76 per cent. to 7·05 per cent. w/w of H_2SO_3. Residue on evaporation and gentle ignition, not more than 0·01 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million.

Assay.—Mix about 1 gramme, accurately weighed, with 25 millilitres of N/10 iodine, allow to stand for about five minutes, and titrate the excess of iodine with N/10 sodium thiosulphate; each millilitre of N/10 iodine is equivalent to 0·003203 gramme of SO_2.

Action and Uses.—Sulphur dioxide is a powerful antiseptic and disinfectant; it destroys protoplasm by its reducing action, in virtue of which it absorbs oxygen in the presence of moisture and is converted into sulphuric acid. When present in sufficient concentration (5 per cent. or more), it suffocates by inhibiting respiration or by producing spasm of the larynx. Although 0·5 per cent. can usually be tolerated for a long time, as little as 0·1 per cent. has been reported to cause death and even 1 part in 20,000 may irritate the eyes and bronchial tract.

Sulphur dioxide is a popular disinfectant used to fumigate rooms; for efficient disinfection about 2 to 4 volumes per cent. should be present in a moist atmosphere for at least twelve hours. From 2 to 4 pounds of sulphur should be burned for each 1000 cubic feet of air space, or its equivalent of liquefied sulphur dioxide vapourised, and the room sealed up for twenty-four hours. Sulphur dioxide and sulphites may be used as preservatives in sausages and sausage meat, dried and undried fruit and fruit pulp, certain sweetened or unsweetened non-alcoholic wines, cordials and fruit juices, jam, candied peel, sugar, glucose, beer, cider, alcoholic wines and sweetened mineral waters. The proportions, calculated as parts of sulphur dioxide per million, must not exceed those specified in the Public Health (Preservatives, etc., in Food) Regulations, 1925.

Sulphurous acid, mixed with an equal volume of glycerin or water, is applied externally for ringworm and other parasitic diseases and, when more diluted, for chapped hands and unbroken chilblains. In

tonsillitis and septic sore throat, sulphurous acid, or Lotio Acidi Sulphurosi, is used as a paint or spray. For inhalation in asthma and whooping cough, 4 millilitres (1 fluid drachm) may be added to 600 millilitres (1 pint) of cold or tepid water. Sulphurous acid, diluted with 10 parts of water, is useful for removing grease, mucus, etc., from marine sponges after their use in surgical operations. Sulphurous acid is **incompatible** with all oxidising agents.

Preparation

Lotio Acidi Sulphurosi, B.P.C.—(Lot. Acid. Sulphuros.)—Lotion of Sulphurous Acid. Sulphurous acid and glycerin of tannic acid, of each 1 in 4, in distilled water.

ACIDUM TANNICUM

(Acid. Tann.)

Tannic Acid

Synonym—Tannin.

Tannic acid may be obtained from galls by subjecting them to a special fermentation and extracting with water-saturated ether. It occurs as yellowish-white or light brown, glistening scales, light masses, or as an impalpable powder; it has a characteristic odour and a strongly astringent taste. Tannic acid is not a carboxylic acid, but a tannin which contains a glucose nucleus and is converted by hydrolysis with dilute sulphuric acid into gallic acid and dextrose. This decomposition indicates that its minimum complexity is represented by a pentadigalloyl-glucose, $C_{76}H_{52}O_{46}$, a view in good accordance with its slightly acid reaction, molecular weight and dextro-rotation. It acts as a dibasic acid.

Many commercial samples contain gallic acid, the presence of which reduces the solubility and may be detected by the production of a pink colour on the addition of a 5 per cent. potassium cyanide solution. These varieties of tannic acid are used in dyeing, in the manufacture of ink, etc., and are not suitable for medicinal use; they occur in coarse powder or lumps, darker in colour than the official substance. An aqueous solution of tannic acid produces precipitates with solutions of gelatin, albumin, tartar emetic and some alkaloids. Tannic acid in aqueous solution undergoes hydrolysis slowly, and the oxidation of the gallic acid formed results in a dark-coloured solution. Tannic acid may be identified by the bluish-black colour produced on adding ferric chloride solution to the aqueous solution; the colour disappears on the addition of sulphuric acid with formation of a yellowish-brown precipitate.

Soluble in water (1 in 1), and alcohol (90 per cent.) (1 in 1); very soluble in acetone; slowly soluble in glycerin (1 in 1); almost insoluble in ether, chloroform, benzene and light petroleum.

Standard, B.P.—Tannic acid loses on drying at 100° not less than 6 per cent. and not more than 12 per cent. of its weight. Ash, not more than 0·2 per cent. It complies also with a limit test for gums, dextrin, sugars and salts.

Action and Uses.—Tannic acid is strongly astringent, but somewhat irritating. Its properties depend upon the formation of insoluble compounds with albumin and other proteins. Its solutions produce in the mouth a feeling of dryness and roughness, owing to coagulation of the protein material surrounding the epithelium and some of the superficial cells. In the stomach it combines with any proteid substance with which it may come in contact, forming an insoluble compound, but as digestion proceeds and the stomach contents become more acid, the protein tannate is broken up so that some uncombined tannic acid probably passes into the intestines. By coagulating proteins and diminishing the secretions in the small intestine, tannic acid tends to produce constipation. A small proportion, only about 1 per cent., reappears in the excretions either as tannic or gallic acid. The greater part of the tannic acid is converted in the alimentary canal into gallic acid, which is either absorbed or undergoes oxidation. Large doses may produce vomiting.

Tannic acid is seldom given **internally,** but is occasionally used for diarrhœa. As intestinal astringents the combined tannic acids existing in catechu, kino and rhatany, and also several synthetic compounds of tannic acid are preferred because they are less readily absorbed. It is much more generally used for **external** application. If it can be brought into direct contact with a bleeding surface it exerts a hæmostatic action, but it cannot control any form of remote hæmorrhage. The powder may be applied, or a solution (5 per cent.) on lint, or Collodium Stypticum may be employed. As an astringent for relaxed sore throats, Glycerinum Acidi Tannici may be used as a paint, or the acid employed in the form of a lozenge, gargle, or spray. Glycerin of tannic acid, when diluted with 6 or 8 parts of water, is also used in stomatitis, ozœna, inflamed tonsils and pharyngeal irritation. The powder is used for insufflation, for applying to the gums as an astringent, and, in the form of an ointment, for hæmorrhoids. Solutions (1 or 2 per cent.) are employed as lotions and injections for douching the nostrils in epistaxis and for use in leucorrhœa. A 20 per cent. solution in alcohol has been found useful for application to spongy and receding gums. In ulcerative colitis the bowel may be irrigated daily with a solution of tannic acid, 0·2 to 0·5 per cent., after gently washing it free from blood, mucus and fæces with warm saline solution. Suppositories of tannic acid are used as an astringent application to hæmorrhoids, sometimes with the addition of liquid extract of belladonna to allay pain. A warm, freshly prepared 2 per cent. aqueous solution is extensively used for the treatment of burns; Lotio Acidi Tannici is also suitable for this purpose. It may be sprayed on to the burned area by means of an atomiser, or applied as a moist dressing.

The acid may be **administered** in the form of a mixture or as a pill,

massed with one-eighth part of its weight of glycerin of tragacanth, and in cachets. Suppositories, pessaries and bougies are prepared with oil of theobroma. It is **incompatible** with salts of iron, lead, antimony and silver, alkaloids, albumin and gelatin. Tannic acid is sometimes given as an antidote in cases of poisoning by certain alkaloids, with the object of rendering insoluble any alkaloid remaining in the stomach. It is also used as an antidote in cases of antimonial poisoning.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Preparations

Collodium Stypticum, B.P.C.—(Collod. Stypt.)—Styptic Collodion. Tannic acid, about 1 in 6½, with benzoin, alcohol, and simple collodion.

Gargarisma Acidi Tannici, B.P.C.—(Garg. Acid. Tann.)—Tannic Acid Gargle. Glycerin of tannic acid, 1 in 8, with distilled water.

Glycerinum Acidi Tannici, B.P.—(Glycer. Acid. Tann.)—Glycerin of Tannic Acid. Tannic acid, 15 per cent. w/w, dissolved in glycerin. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Lotio Acidi Tannici, B.P.C.—(Lot. Acid. Tann.)—Lotion of Tannic Acid. Tannic acid, 2 per cent., and mercuric chloride, 1 in 2000, in distilled water.

Solvellæ Acidi Tannici Compositæ, B.P.C.—(Solv. Acid. Tann. Co.)—Compound Tannic Acid Solution-Tablets. Each solution-tablet contains 8¾ grains of tannic acid and ¼ grain of mercuric chloride. One tablet dissolved in 1 fluid ounce of water forms a solution containing 2 per cent. of tannic acid and about 1 in 1750 of mercuric chloride.

Suppositorium Acidi Tannici, B.P.—(Supp. Acid. Tann.)—Tannic Acid Suppository. Each suppository contains 0·2 gramme (3 grains) of tannic acid.

Syrupus Iodotannicus, B.P.C.—(Syr. Iodotann.)—Iodotannic Syrup. Iodine and tannic acid, of each, 1 per cent. w/w with syrup and syrup of lemon. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Syrupus Iodotannicus cum Phosphate, B.P.C.—(Syr. Iodotann. c. Phosph.)—Iodotannic Syrup with Phosphate. Each fluid drachm contains about 2½ grains of calcium phosphate in iodotannic syrup. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm), well diluted.

Trochiscus Acidi Tannici, B.P.—(Troch. Acid. Tann.)—Lozenge of Tannic Acid. *Syn.*—Tannic Acid Lozenge. Each lozenge contains approximately 0·03 gramme (½ grain) of tannic acid.

Unguentum Acidi Tannici, B.P.—(Ung. Acid. Tann.)—Ointment of Tannic Acid. *Syn.*—Tannic Acid Ointment. Tannic acid, 20 per cent., with glycerin, yellow beeswax and benzoinated lard.

ACIDUM TARTARICUM

(Acid. Tart.)

Tartaric Acid

$C_4H_6O_6 = 150·0$

Tartaric acid is *d*-dihydroxysuccinic acid, $(CHOH·COOH)_2$, and

may be prepared from argol, crude potassium acid tartrate. It occurs as odourless, colourless crystals, or as a white powder, with a strongly acid taste.

Soluble in water (1 in 0·8), alcohol (90 per cent.) (1 in 2·5); slightly soluble in ether.

Standard, B.P.—Tartaric acid contains not less than 99·5 per cent. of $C_4H_6O_6$, calculated on the substance dried at 100°. Loss on drying at 100°, not more than 1 per cent. Ash, not more than 0·1 per cent. Arsenic limit, 1 part per million. Lead limit, 20 parts per million. It complies also with limit tests for copper and iron, and sulphate.

Action and Uses.—Tartaric acid is wholly or partly neutralised in the intestine, and a very small portion is absorbed; the greater amount, however, passes through the alimentary canal as sodium tartrate, and acts as a saline aperient, tending to make the stools more watery. The portion absorbed is for the most part converted into sodium carbonate, which renders the urine less acid.

Tartaric acid is employed to make saline draughts and cooling drinks for febrile and diabetic patients; if not neutralised it must be taken well diluted, or severe gastro-enteritis may ensue. The following are the proportions necessary to form approximately neutral mixtures:—Tartaric acid, 10 parts, requires ammonium carbonate, about 7 parts; magnesium carbonate, about 6½ parts; potassium bicarbonate, about 13¼ parts; sodium bicarbonate, about 11¼ parts. In cases of **poisoning** by tartaric acid, calcium hydroxide or magnesium hydroxide mixed with water should be given freely; the administration of alkali carbonates should be avoided.

Dose.—0·3 to 2 grammes (5 to 30 grains).

ACIDUM MALICUM.—Malic acid, $HOOC{\cdot}CHOH{\cdot}CH_2{\cdot}COOH$, is contained in apples, pears, mountain-ash berries and many other fruits, also in rhubarb stalks. It occurs as colourless, odourless, prismatic crystals, readily fusible and deliquescent. It exists in two forms, dextro- and lævorotatory. An aqueous solution is not precipitated by calcium chloride, but on the addition of alcohol, a bulky, white precipitate of calcium malate is formed. Lead acetate solution produces a precipitate which is soluble in strong ammonia but, unlike lead tartrate and citrate, is not easily soluble in slight excess of ammonia. It is soluble in water, alcohol, and ether. The action of malic acid is similar to that of tartaric acid; it has been used in the preparation of effervescent salines.

AMYLIS TARTRAS.—Amyl tartrate, $(CHOH{\cdot}COOC_5H_{11})_2$, may be obtained by the esterification of *iso*amyl alcohol with tartaric acid and occurs as a colourless liquid with a specific gravity of about 1·05 and a boiling-point of about 400°. It is used as a plasticising solvent in the manufacture of lacquers and varnishes.

BUTYLIS TARTRAS.—Butyl tartrate, $(CHOH{\cdot}COOC_4H_9)_2$, may be obtained by the esterification of butyl alcohol with tartaric acid. It occurs as a colourless liquid with a specific gravity of about 1·064 to 1·091 and a boiling-range of 292° to 312°. It is miscible with oils and hydrocarbons and is used as a solvent in the manufacture of lacquers and varnishes.

ACIDUM TRICHLORACETICUM

(Acid. Trichloracet.)

Trichloracetic Acid

$C_2HO_2Cl_3 = 163{\cdot}4$

Trichloracetic acid, $CCl_3{\cdot}COOH$, may be prepared by the oxidation of chloral with nitric acid. It occurs as colourless, very deliquescent crystals or crystalline masses, with a characteristic, pungent odour. The acid melts at about 55° and boils at about 195°. When warmed with sodium hydroxide solution it is converted into chloroform with formation of sodium carbonate. It should be **stored** in well-closed containers.

Very **soluble** in water (about 9 in 1), giving a strongly acid solution; soluble in alcohol (90 per cent.) and ether.

Standard, B.P.—Trichloracetic acid contains not less than 98 per cent. of $C_2HO_2Cl_3$. Ash, not more than 0·05 per cent. It complies also with limit tests for nitrate and chloride.

Action and Uses.—Trichloracetic acid is applied **externally** as a caustic to venereal and other warts, and is less painful than nitric acid; the application of a crystal produces an eschar without subsequent inflammation. It has also been employed in strong solution, 1 part in 2 parts of glycerin, as a caustic in chronic pharyngitis. Liquefied trichloracetic acid may be prepared by the addition of 10 per cent. of water to the crystalline acid. Weak solutions, containing 1 per cent. or less, have a powerful disinfectant action and such solutions may be applied to wounds and ulcers or used in erysipelas without causing irritation. As a delicate test for albumin in urine, a few drops of saturated solution are added to the filtered urine without mixing. In the presence of albumin a white cloudiness appears at the junction of the two liquids. It is also used as a quantitative test for proteins in certain body fluids, such as the cerebro-spinal fluid.

ACONITI FOLIUM

(Aconit. Fol.)

Aconite Leaf

Synonyms—Monkshood; Wolfsbane.

Aconite leaf consists of the dried leaves and flowering tops of *Aconitum Napellus* Linn. (Fam. Ranunculaceæ), a perennial herbaceous plant growing in the mountainous districts of Europe, Asia and North America, and cultivated in England. It is gathered when about one-third of the flowers are expanded. It is also used in the fresh condition.

The leaves are petiolate, dark green in colour, glabrous, roundish in

general outline, and divided down to the leaf stalk into three segments, the two lateral segments being again divided nearly to the base; each of the five divisions is pinnatifid, with linear, acute, tapering lobes, the lower being longer and somewhat spreading. The blue, zygomorphic flowers are arranged in a raceme. The calyx is petaloid, the posterior sepal being galeate and sub-hemispherical. The two posterior petals are modified to hammer-shaped nectaries enclosed by the posterior sepal, the remaining three being quite inconspicuous. The stamens are numerous with hairy filaments and the apocarpous gynœcium consists of three carpels. The herb has no odour; when cautiously chewed, a characteristic tingling and numbing sensation slowly develops. Calcium oxalate crystals are absent.

Aconite leaf **contains,** when dry, from 0·1 to 1·0 per cent. of total alkaloids. The poisonous alkaloid aconitine is undoubtedly one of the chief constituents, but the extent to which it occurs, and the nature of the other alkaloids that accompany it, are questions which have not yet been definitely answered. Probably both picraconitine (benzoyl-aconine) and aconine are present. It also contains aconitic acid and tannin.

Action and Uses.—The properties of aconite leaf are essentially those of the alkaloid aconitine. The drug has been used for the preparation of an extract, but its use is dangerous and the root is preferable.

ACONITINA

(Aconitin.)

Aconitine

$C_{34}H_{47}O_{11}N = 645{\cdot}4$

Aconitine is an intensely poisonous alkaloid obtained from the roots of *Aconitum Napellus* Linn. It occurs in translucent, hexagonal prisms, or as a colourless, odourless, crystalline powder. The specific rotation in chloroform is about $+17{\cdot}0°$. An alcoholic solution of aconitine is slightly alkaline to litmus paper. One drop of a filtered aqueous solution (1 in 10,000) produces a characteristic, tingling sensation when placed on the tip of the tongue. 0·25 gramme, boiled on a water-bath for one hour with 2 millilitres of N/2 alcoholic solution of potassium hydroxide, leaves, on distilling off the alcohol, a residue which is soluble in water, and which, on acidification and extraction with ether, yields benzoic acid. On warming 0·05 gramme on a water-bath for five minutes with 4 drops of sulphuric acid, an odour of benzoic acid is perceptible, and on the addition of a crystal of resorcinol and further warming, a reddish-orange colour is produced. A solution in dilute acetic acid and water produces a blood-red or purple, crystalline precipitate on the addition of a few drops of potassium permanganate solution, and the mixture is not changed on the addition of bromine water (distinction from cocaine and hydrastine which become orange and

yellow respectively). It should be **stored** in well-closed containers protected from light.

Soluble in alcohol (1 in 30), ether (1 in 65), benzene (1 in 7) and chloroform (1 in 1); sparingly soluble in water.

Standard.—Aconitine, when heated rapidly, melts between 196° and 200°, with evolution of acetic acid. Ash, not more than 0·1 per cent. No colour is produced immediately on dissolving 0·05 gramme in 4 drops of sulphuric acid. 0·01 gramme dissolved in 5 drops of fuming nitric acid and evaporated to dryness on a water-bath leaves a yellow residue which does not become red when moistened with N/2 alcoholic solution of potassium hydroxide (limit of pseudaconitine).

Action and Uses.—Aconitine is rarely given **internally** on account of its extremely powerful cardiac action. It has a very characteristic effect on sensory nerve endings. It is not absorbed through unbroken skin, but when applied with alcohol or fat, typical tingling, followed by numbness, is produced. When taken by the mouth the same excitation of the sensory nerve endings is induced, and this is especially marked in the more sensitive parts of the body, such as the tongue, throat and finger-tips. This action has led to its employment in trigeminal neuralgia. The medulla is first excited and then depressed; hence, after small doses, respiration is increased in depth and frequency, the pulse becomes slower, and the peripheral vessels tend to constrict, but the blood pressure does not rise on account of the decided cardiac slowing. Large doses quicken the heart and may produce marked cardiac irregularities. It produces a marked fall in temperature both in fever and in normal conditions. It is used **externally** in the form of ointment to relieve neuralgic pains, but should not be applied to mucous surfaces or to abraded skin. In cases of **poisoning** by aconitine, the treatment described under Aconitum should be applied.

Dose.– 0·0001 gramme ($\frac{1}{6\,4\,0}$ grain).

ACONITINÆ HYDROBROMIDUM.—Aconitine hydrobromide, $C_{34}H_{47}O_{11}N$, $HBr,2\frac{1}{2}H_2O$, crystallises from water in rhombic plates. It sinters at 163° to 164°; after drying *in vacuo* at 110° it melts between 176° and 180°. It is soluble in water and alcohol. Dose.– 0·0001 gramme ($\frac{1}{6\,4\,0}$ grain).

ACONITINÆ HYDROCHLORIDUM.—Aconitine hydrochloride, $C_{34}H_{47}O_{11}N$, $HCl,3H_2O$, crystallises from water in rhombic plates. It melts at about 149° and, after drying *in vacuo* at 110°, at about 174°. It is soluble in water and in alcohol. Dose.– 0·0001 gramme ($\frac{1}{6\,4\,0}$ grain).

ACONITINÆ NITRAS.—Aconitine nitrate, $C_{34}H_{47}O_{11}N,HNO_3$, occurs in the form of colourless, prismatic crystals. It melts at about 200°. It is soluble in boiling water (1 in 10). Salts of aconitine, preferably the nitrate (1 in 500,000 in distilled water), are of considerable value in the treatment of neuralgia by ionisation. Solutions for injection may be sterilised by tyndallisation at 70° for one hour on three successive days, or by filtration. The containers must comply with tests for limit of alkalinity of glass. Dose.– 0·0001 gramme ($\frac{1}{6\,4\,0}$ grain).

Preparations

Collodium Anodynum, B.P.C.—(Collod. Anodyn.)—Anodyne Collodion. *Syn.*— Anodyne Colloid. Aconitine, about 0·1 per cent. w/v, and veratrine, about 0·7 per cent. w/v, in acetone and acetone collodion.

Unguentum Aconitinæ, B.P.C.—(Ung. Aconitin.)—Aconitine Ointment. Aconitine, 2 per cent., in oleic acid and lard.

This ointment was included in the British Pharmacopœia, 1914.

ACONITUM
(Aconit.)

Aconite

Synonyms—Aconiti tuber I.A.; Aconiti Radix; Aconite Root.

Aconite is the dried root of *Aconitum Napellus* Linn. (Fam. Ranunculaceæ). The roots are dried either entire or longitudinally sliced.

The root is dark brown and obconical, and bears numerous rootlets or the scars left by them. It varies from about 4 to 10 centimetres in length and from 1 to 3 centimetres in width at the crown, to which is attached the base of the aerial stem or the remains of a bud. The fracture is short, and the smoothed, transverse surface exhibits a thick bark separated from the inner portion by a darker stellate cambium with 5 to 8 projecting angles. Aconite has a faint odour; the taste is at first slight, but is followed by a persistent sensation of tingling and numbness.

The diagnostic **microscopical** characters are the brown-walled, tabular cells of the metaderm; the occasional sclerenchymatous cells, of various shapes and with lignified walls, from the parenchymatous tissue of the cortex and secondary phloem; the abundant parenchyma containing small starch grains, simple or 2 to 5-compound, individual grains measuring up to 30 microns in diameter; fragments of vessels; the absence of fibres and calcium oxalate crystals.

Aconite **contains** the three alkaloids, aconitine (acetylbenzoylaconine), picraconitine (benzoylaconine or benzaconine) and aconine, but it is to the first-named only that the toxic action of the root is due. The total amount of alkaloid present varies from 0·2 to 1·5 per cent. The ether-soluble alkaloids (chiefly aconitine) vary usually from 0·3 to 0·6 per cent. Other constituents are starch and aconitic acid.

Varieties.—English root consists chiefly of daughter roots each of which is crowned by the remains of a bud. Much of the aconite at present in commerce is imported from Germany and consists chiefly of the dried parent root of the flowering plants. It may be recognised by the remains of the aerial stem which crown the root; it is also generally less starchy, darker internally and more shrivelled than English root.

Substitutes.—Japanese aconite is said to be obtained from *A. uncinatum* Linn. var. *japonicum* Regel; it is distinguished by its dark greyish colour, smaller size, smoother surface and circular cambium; it contains japaconitine (acetylbenzoyljapaconine) which has an action similar to that of aconitine and may be identical with it. Indian (Nepaul) aconite (bikh or bish) consists of the root of *A. deinorrhizum* Stapf; the larger size and less tapering character sufficiently distinguish it from the official drug. It contains pseudaconitine (acetylveratroylpseudaconine), which

is about twice as active as aconitine. Atis root (*A. heterophyllum* Wall) and the roots of certain other species of *Aconitum* occur in commerce; they contain non-poisonous alkaloids and may be distinguished by the absence of a tingling taste.

Standard, B.P.—Aconite contains not more than 2 per cent. of other organic matter. The British Pharmacopœia states that there is no trustworthy chemical method of assay for aconite and that it is not considered to be a drug of sufficient medicinal value to justify a biological method of assay.

Aconite, in powder (Pulvis Aconiti : Pulv. Aconit.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug. Pulvis Aconiti I.A. is adjusted, by dilution with rice starch if necessary, to contain 0·5 per cent. of total alkaloids.

Action and Uses.—The properties of aconite are virtually those of aconitine. Owing to the extremely poisonous nature of the drug, all preparations thereof should be used with great care. For **internal** use, the tincture, well diluted, is employed as a mild diaphoretic to reduce feverishness in common colds, and in the early stages of acute infections, such as tonsillitis, laryngitis, and bronchitis. Very small doses, frequently repeated, are preferred to full doses to diminish the frequency of the pulse. Preparations of aconite are not usually given when there is cardiac disease. **Externally,** the liniment, compound paint and chloroform of aconite are used as anodynes in neuralgia, sciatica and acute rheumatism, but such preparations must not be used on abraded surfaces on account of the danger of absorption. A strong tincture is prepared for external application, and is sometimes used with an equal quantity of strong or weak solution of iodine to paint the gums in dental periostitis. This tincture is an extremely powerful preparation. Aconite plasters are prepared in rubber combination, and pastilles are used in tonsillitis and laryngitis, but should not be administered too freely. In cases of **poisoning** by aconite, the stomach should be emptied by means of the stomach pump, or apomorphine, $\frac{1}{10}$ grain, should be given hypodermically. An emetic of mustard, zinc sulphate, or ipecacuanha, followed by stimulants, and atropine and digitalis have been recommended. The patient should be kept lying down, and warmth applied.

Preparations

Chloroformum Aconiti, B.P.C.—(Chlorof. Aconit.)—Chloroform of Aconite. A 1 in 1 preparation of aconite, obtained by percolating the drug, previously moistened with dilute solution of ammonia, with a mixture of chloroform and alcohol.

Linimentum Aconiti, B.P.—(Lin. Aconit.)—Liniment of Aconite. An alcoholic extract of aconite, 1 in 2, prepared with alcohol (90 per cent.), or with industrial methylated spirit suitably diluted, and containing also 3 per cent. w/v of camphor.

Linimentum Aconiti Oleosum, B.P.C.—(Lin. Aconit. Oleos.)—Liniment of Aconite with Oil. *Syn.*—A.B.C. Liniment. Equal parts of liniment of aconite, liniment of belladonna and liniment of chloroform. The non-oily liniment of the British Pharmaceutical Codex, 1923, is included under the name of Pigmentum Aconiti Compositum.

Pigmentum Aconiti Compositum, B.P.C.—(Pig. Aconit. Co.)—Compound Aconite Paint. Liniment of aconite and liniment of belladonna, of each 37·5 per cent. v/v, with chloroform and distilled water.

Pigmentum Iodi et Aconiti, B.P.C.—(Pig. Iod. et Aconit.)—Iodine and Aconite Paint. Weak solution of iodine and strong tincture of aconite, equal parts.

Tinctura Aconiti, B.P.C.—(Tinct. Aconit.)—Tincture of Aconite. About 1 in 6. Dose.– 0·12 to 0·3 millilitre (2 to 5 minims).

This tincture, standardised to contain 0·04 per cent. w/v of ether-soluble alkaloids, was included in the British Pharmacopœia, 1914.

Tinctura Aconiti I.A. is prepared with alcohol (70 per cent.) and contains 0·05 per cent. of total alkaloids. Extractum Aconiti I.A. contains 1 per cent. of total alkaloids. Sirupus Aconiti I.A. is prepared from the tincture and contains 0·0025 per cent. of total alkaloids.

Tinctura Aconiti Fortis, B.P.C.—(Tinct. Aconit. Fort.)—Strong Tincture of Aconite. *Syn.*—Fleming's Tincture of Aconite. It is about five times the strength of Tinctura Aconiti and is not used for internal administration.

ACRIFLAVINA

(Acriflavin.)

Acriflavine

$C_{14}H_{14}N_3Cl,HCl = 296·1$

Acriflavine is a mixture of the hydrochlorides of 2 : 8-diamino-10-methylacridinium chloride and diaminoacridine, and may be prepared by the combination of methyl *p*-toluenesulphonate with 2 : 8-diacetyldiaminoacridine and hydrolysis of the product with hydrochloric acid. It occurs as an odourless, orange-red or brownish-red, crystalline powder, with an acid taste. The 0·1 per cent. aqueous solution is fluorescent and has a deep orange colour, changing to red on the addition of a few drops of solution of methyl orange. Acriflavine may be distinguished from fluorescein by the bulky yellow precipitate produced on the addition of a 10 per cent. solution of sodium salicylate. It may be determined volumetrically by the assay process for Euflavina; each millilitre of M/10 potassium ferricyanide is equivalent to 0·08883 gramme of $C_{14}H_{14}N_3Cl,HCl$.

Soluble in water (1 in 3), and alcohol (90 per cent.); almost insoluble in ether, chloroform, liquid paraffin, and fixed and volatile oils.

Standard, B.P.—Acriflavine, after moistening with sulphuric acid and gently igniting, and again moistening and igniting, leaves not more than 1 per cent. of residue. It complies also with a limit test for proflavine and with tests for the stability of its solutions in water and in normal saline.

Action and Uses.—Acriflavine is a powerful antiseptic. It has been credited with trypanocidal powers, though it is not now used in the treatment of trypanosomiasis. Its bactericidal action is increased by the presence of serum and in this respect it differs from most other antiseptics; the presence of whole blood appears to diminish its activity.

Concentrations sufficient to inhibit the growth of organisms do not interfere with normal phagocytic action and are without harmful effect on the tissues locally, hence its suitability in the treatment of suppurating wounds, but it should be noted that, after prolonged treatment, wounds tend to become sluggish in healing. Solutions of 1 in 1000 in normal saline are recommended, but weaker solutions are sometimes used. Emulsio Acriflavinæ is a suitable application for general use. Pessaries are usually composed of one part of acriflavine in 500 parts of oil of theobroma or glycerin suppository basis.

Acriflavine can be employed as a urinary disinfectant and has been used in the treatment of gonorrhœa, being given by the mouth in doses of 0·1 gramme (1½ grains) three times daily, or intravenously in smaller doses. Solutions for **injection** may be prepared by aseptic methods and stored protected from light. Its action is more marked if the urine is kept alkaline. Recently it has been shown that its use internally is not without risk of grave toxic results. Cases have been reported in which death has followed its administration, the liver and kidneys being the organs particularly affected. The jaundice occurring in these cases may be delayed for weeks or months after the last dose. Acriflavine stains may be removed by the application of a dilute solution of sulphurous acid.

AURAMINA.—Auramine is tetramethyldiaminodiphenylketonimine hydrochloride, and occurs as a yellow powder soluble in water. The aqueous solution decomposes slowly in the cold but rapidly on heating. It is used as a non-irritant antiseptic in dilute aqueous solution (0·1 to 1 per cent.).

QUINANILUM.—Quinanil, or "48S," is a sulphonated-2-(*p*-dimethylaminoanil)-6-methylquinoline methochloride and is used in dilute aqueous solution as an antiseptic in the treatment of wounds and various infections, particularly of the genito-urinary system.

Preparations

Emulsio Acriflavinæ, B.P.C.—(Emuls. Acriflavin.)—Emulsion of Acriflavine. Acriflavine, 1 in 1000, with liquid paraffin, white beeswax and distilled water.

Liquor Acriflavinæ, B.P.C.—(Liq. Acriflavin.)—Solution of Acriflavine. Acriflavine, 0·1 per cent. w/v, in physiological solution of sodium chloride.

ADEPS
(Adeps)
Lard

Synonyms—Adeps Præparatus; Prepared Lard.

Lard is the purified internal fat of the hog, *Sus scrofa* Linn. (Order Ungulata). It is prepared from the "flare," or omentum, by washing the flat, leafy masses and removing external membranes as far as possible; the product is then heated to a temperature not above 57° until the fat has melted, and strained. It is a soft, white, unctuous fat

with a faint, but not rancid, odour and yields when melted a clear liquid which does not deposit on standing.

Lard may be identified by the characteristic shape of the crystals deposited from a 25 per cent. w/v ethereal solution on standing for eighteen hours at 20°, when mounted in alcohol (95 per cent.) or in a fixed oil; the crystals form irregular groups of flat, rhomboidal plates, cut off obliquely at one end. Lard consists of olein, about 60 per cent., associated with variable amounts of stearin and palmitin, approximately 40 per cent.; it does not contain any vitamins.

Insoluble in water; very slightly soluble in alcohol (90 per cent.); soluble in ether (1 in 22), oil of turpentine (1 in 16), chloroform and light petroleum; it is also soluble in carbon disulphide yielding a slightly turbid solution.

Standard, B.P.—Lard, after preliminary treatment as described, melts between 34° and 41°. Refractive index at 60°, 1·452 to 1·455. Acid value, not more than 1·2. Saponification value, 192 to 198. Unsaponifiable matter, not more than 0·5 per cent. Iodine value, 52 to 66. It complies also with tests for the absence of beef fat, sesame oil, cotton-seed oil, alkalis and chloride.

Uses.—Lard is employed as a basis for the preparation of ointments which are intended to be absorbed. On account of its tendency to become rancid it is, however, less used than formerly. When used in the form of Adeps Benzoinatus, the benzoic acid present in the benzoin acts as an antiseptic and prevents the lard from becoming rancid. The acid, however, renders the lard slightly irritant and unsuitable for application to such sensitive parts as the conjunctiva. Benzoinated lard should not be used in the preparation of ointments containing alkaloidal bases. In India, suet should be used for making preparations for which lard is directed to be used.

OLEUM ADIPIS.—Lard oil may be obtained by pressure from lard. It occurs as a colourless, or pale yellow, oily liquid, having a peculiar odour and bland taste. It is slightly soluble in boiling alcohol, and easily soluble in ether, chloroform, benzene and carbon disulphide.

Preparation

Adeps Benzoinatus, B.P.—(Adeps Benz.)—Benzoinated Lard. Lard containing the fat-soluble matter from 3 per cent. of benzoin.

ADEPS LANÆ

(Adeps Lan.)

Wool Fat

Synonym—Anhydrous Lanolin.

Wool fat is the purified, anhydrous, fat-like substance obtained from the wool of the sheep, *Ovis aries* Linn. (Order Ungulata). The

natural grease is extracted from the wool by kneading with water, with which it readily forms an emulsion; on heating, it separates as a distinct layer at the surface of the liquid. Purification is effected by repeated treatment with water in a centrifugal machine or by other methods. It occurs as a pale yellow, tenacious, unctuous substance with a faint but characteristic odour, and melts at about 37°.

Wool fat is a wax and contains the alcohols cholesterol and *iso*-cholesterol, together with various esters, the acids in combination being lanoceric, lanopalmitic, carnaubic, myristic, oleic, and probably cerotic and palmitic acids. A distinctive test is that for cholesterol; 1 gramme of wool fat, dissolved in 3 or 4 millilitres of acetic anhydride, gives with 0·3 millilitre of sulphuric acid a pink colouration soon changing to green and blue. When a 2 per cent. solution in chloroform is gently poured over the surface of concentrated sulphuric acid a purple-red colouration is developed at the junction of the liquids. It is practically impossible to saponify wool fat with aqueous solution of potassium hydroxide, but saponification may be effected by alcoholic potash under pressure or by solution of sodium ethylate.

Insoluble in water; sparingly soluble in cold alcohol (90 per cent.), but more soluble in boiling alcohol (90 per cent.) (about 1 in 75), the solution depositing most of the wool fat in the form of flocks; freely soluble in ether, chloroform, carbon disulphide, acetone, benzene and light petroleum.

Standard, B.P.—Wool fat has a melting-point of 34° to 40°. It loses, when dried at 100° for one hour, not more than 0·5 per cent. Ash, not more than 0·15 per cent. Acid value, not more than 1. Saponification value, 94 to 106. Iodine value, 18 to 32. It complies also with a test for absence of free alkali and with a limit test for chloride.

Action and Uses.—Wool fat is closely allied to the natural secretions of the skin; it is not very readily absorbed, but when mixed with olive oil or soft paraffin it readily penetrates the skin and is useful for promoting the cutaneous absorption of drugs. Unlike lard, it does not readily become rancid. It takes up about 50 per cent. of water and is thus available for use in ointments in which the proportion of water is too great to permit of incorporation with any other fatty base. By the addition of a small quantity of wool fat to soft or liquid paraffin, the latter can be formed into stable emulsions with water, as in the preparation of parenols.

Hydrous wool fat is employed as an ointment basis, generally for substances in aqueous solution. It may be mixed with olive oil, soft paraffin, or lard, by which its stickiness is much diminished and its absorbability increased. Wool fat should be used in preference to hydrous wool fat in the preparation of ointments containing phenol, mercuric chloride, or other antiseptics, so as to minimise the caustic action resulting from absorption.

CHOLESTEROL.—Cholesterol, $C_{27}H_{46}O,H_2O$, is the crude sterol prepared from wool fat, bile, gall stones, or blood. It may be obtained from wool fat by saponification with potassium hydroxide and extraction with ether. It occurs as a white, inodorous, crystalline substance, soluble in ether and hot alcohol, but insoluble in water. It melts at about 145°. Cholesterol is present normally in the blood to the extent of about 0·18 per cent. In certain forms of nephritis, particularly the chronic parenchymatous variety, a rise in blood cholesterol to 0·3 per cent. may be observed. Cholesterol has been suggested as a local stimulating application in alopecia; lotions should contain 0·25 to 0·5 per cent. w/v in alcohol with 3 to 5 per cent. of glycerin. The addition of 0·5 to 1 per cent. of cholesterol to soft paraffin renders possible the incorporation of 10 to 20 per cent. of an aqueous solution in an ointment. Contrary to original ideas, irradiated solutions of highly purified cholesterol have no antirachitic potency.

Preparations

Adeps Lanæ Hydrosus, B.P.—(Adeps Lan. Hydros.)—Hydrous Wool Fat. *Syn*—Lanolin. Wool fat, with 30 per cent. of water.

Unguentum Adipis Lanæ, B.P.C.—(Ung. Adip. Lan.)—Wool Fat Ointment. *Syn*—Unguentum Lanolini Anhydrosi; Anhydrous Lanolin Ointment. Wool fat and yellow soft paraffin, equal parts.

Unguentum Adipis Lanæ Compositum, B.P.C.—(Ung. Adip. Lan Co.)—Compound Wool Fat Ointment. *Syn.*—Unguentum Lanæ Compositum; Emollient Ointment. Lard and wool fat, of each 40 per cent., and yellow paraffin ointment, 20 per cent.

This ointment was included in the British Pharmacopœia, 1914, under the name of Unguentum Lanæ Compositum.

Unguentum Adipis Lanæ Hydrosi, B.P.C.—(Ung. Adip. Lan. Hydros.)—Hydrous Wool Fat Ointment. *Syn.*—Unguentum Lanolini; Lanolin Ointment. Hydrous wool fat and yellow soft paraffin, equal parts.

ADHATODA

(Adhat.)

Adhatoda

Synonyms—Adhatodæ Folia; Malabar Nut Leaves; Vasaka.

Adhatoda consists of the leaves of *Adhatoda Vasica* Nees (Fam. Acanthaceæ), a shrub or small tree indigenous to and cultivated in India.

The leaves vary from 10 to 20 centimetres in length and are about 3·5 to 6 centimetres broad; they are entire, lanceolate, somewhat acuminate and shortly petiolate. When dry, they are dull greenish-brown, and possess a characteristic odour and bitter taste.

The diagnostic **microscopical** characters are stomata of the caryophyllaceous type, few on the upper surface and very numerous on the lower surface; the epidermis, bearing one- to three-celled, thin-walled, warty trichomes and small, sessile, quadricellular glands; the fairly large, elongated cystoliths occurring in the hypodermal and cortical parenchyma of the under surface, but never in the epidermis.

Adhatoda **contains** a bitter, crystalline alkaloid, vasicine ($C_{11}H_{12}ON_2$, melting-point, about 190° to 191°), which is said to exist in combination

with an acid that has been named adhatodic acid. A second alkaloid has been reported to be present, as well as an odorous, volatile principle, organic acids and mucilage.

Action and Uses.—Adhatoda acts as an irritant to the alimentary canal, large doses causing vomiting and diarrhœa. It is used as an expectorant in the form of liquid extract, juice, syrup and tincture. More rarely, in asthmatic conditions, the leaves are dried and smoked in the form of cigarettes. It is used in India and the Eastern Colonies, and is said to be non-poisonous to mammals, but to kill fish, insects and lower organisms.

ADRENALINA
(Adrenal.)

Adrenaline

$C_9H_{13}O_3N = 183{\cdot}1$

Synonyms—Adrenalinum; Adrenalin; Epinephrine.

Adrenaline, *l*-α-3 : 4-dihydroxyphenyl-β-methylaminoethanol, $C_6H_3(OH)_2CHOH{\cdot}CH_2{\cdot}NH{\cdot}CH_3$, is an active principle of the suprarenal gland, and may be prepared from an acid extract of the glands of certain mammals, or synthetically. The synthetic base may be prepared from catechol by interaction with chloroacetyl chloride and treatment of the resulting chloroacetylcatechol with methylamine, followed by reduction. The product so obtained is the racemic form and resolution and removal of the less active dextro-base can be effected by crystallisation of the *d*-tartrates, the *l*-adrenaline salt being the more sparingly soluble. It should be kept dry and **stored** in dark-coloured glass containers.

Adrenaline occurs as a white or pale buff-coloured, sphæro-crystalline, odourless powder; it has a slightly bitter taste and produces a temporary numbing effect on the tongue. It dissolves readily in dilute mineral acids and in aqueous solutions of sodium hydroxide or of potassium hydroxide, but not in solutions of ammonia or of the alkali carbonates. Neutral or alkaline solutions are unstable and rapidly become red on exposure to the air. When a few drops of 0·25 per cent. ferric chloride solution are added to a neutral or faintly acid solution of adrenaline, an emerald-green colour is produced which changes to red on standing or on the addition of sodium bicarbonate solution. When 1 millilitre of a solution containing adrenaline is mixed with 1 millilitre of a 0·2 per cent. solution of potassium persulphate and the mixture gently warmed, a red colour slowly appears. A similar colour is formed by treatment with other oxidising agents such as potassium ferricyanide, potassium permanganate, potassium dichromate, hydrogen peroxide, etc. On mixing 1 millilitre of a solution of adrenaline with 2 millilitres of a 10 per cent. ammonium molybdate solution a yellow colour

develops instantly; this test is also given by certain other reducing substances. Adrenaline is not precipitated by potassio-mercuric iodide solution or by picric, tannic, phosphomolybdic, or phosphotungstic acids.

Sparingly **soluble** in water; insoluble in alcohol (90 per cent.), ether, chloroform, liquid paraffin and other organic solvents; slightly soluble in oleic acid with colouration due to the presence of iron in the acid.

Standard, B.P.—Adrenaline has a melting-point of 205° to 212° with decomposition (the rate of rise of temperature being 10° per minute). Ash, not more than 0·01 per cent. A solution in N/1 hydrochloric acid complies with limits for specific rotation.

Action and Uses.—The action of adrenaline is comparable to the effects produced by stimulating the sympathetic nervous system. When injected into the circulation it produces a rapid rise in blood pressure which is brought about largely by the constriction of all vessels innervated by the sympathetic. At first there is acceleration of the heart-beat, but this is followed by slowing and strengthening of the beat owing to the stimulation of the cerebral vagus centre. Intravenous injection of adrenaline has been recommended as a cardiac stimulant in sudden failure, and to relieve surgical, vesical and intestinal bleeding; it is contra-indicated in hæmorrhage occurring during light chloroform anæsthesia. It is usually administered as Liquor Adrenalinæ Hydrochloridi. For intravenous injection, the solution is diluted with 100 to 200 times its volume of physiological sodium chloride solution. It must, however, be remembered that adrenaline should not be injected intravenously except in emergency. Adrenaline is rapidly destroyed in the circulation and its effects are, therefore, transient. Injection directly into the heart has been employed in cases of apparent death. Subcutaneous injection gives rise to local constriction of the vessels, and adrenaline is therefore used, in the dilution of 1 in 30,000 to 1 in 100,000, with local anæsthetics to reduce the hæmorrhage in surgical operations, to prevent absorption and to localise the effect of the anæsthetic. Strong solutions of adrenaline should not be used for hypodermic injection, since they cause ischæmia of the part, which may be followed by sloughing.

Adrenaline is useful in the treatment of anaphylactic reactions or the allergic state, such as urticaria, angioneurotic œdema, hay fever and serum rash, also for counteracting the toxic effects of overdosage with arsphenamine. Subcutaneous injections almost immediately relieve the symptoms in cases of acute spasmodic asthma; here it acts by exciting the broncho-dilator nerve (sympathetic), in contrast to atropine, which depresses the broncho-constrictors (vagus). Injected into the uterus, it arrests post-partum hæmorrhage, promoting contraction of the uterine muscle and constricting the vessels. Although general systemic effects are more satisfactorily obtained from hypodermic than from oral administration, doses of 0·3 to 0·6 millilitre (5 to 10 minims) of Liquor Adrenalinæ Hydrochloridi are given by

the mouth to prevent heart failure in diphtheria. In whooping cough, doses of 0·12 to 0·3 millilitre (2 to 5 minims) by the mouth are said to give good results. It is also used to counteract an overdose of insulin.

Externally, it is employed as a vasoconstrictor and hæmostatic. When applied to mucous membranes it produces ischæmia by constricting the peripheral vessels; it therefore relieves turgescence and is of use in hay fever and other oral, laryngeal, or nasal inflammations. For use as a nasal spray in coryza, hay fever, asthma, epistaxis, etc., a solution of 1 in 5000 to 10,000 is suitable, or Nebula Adrenalinæ Aromatica or Nebula Adrenalinæ et Cocainæ may be used. Adrenaline is applied to the eye in various forms of conjunctivitis, trachoma, etc., for reducing intra-ocular tension in glaucoma and also to arrest progressive myopia. It controls hæmorrhage in ophthalmic and nasal surgery (1 of adrenaline in 5000). As an addition to eye lotions in conjunctivitis, 1 of adrenaline in 4000 is sufficient. Adrenaline may be used also in the form of suppositories or ointment for its constrictive action upon hæmorrhoids and other inflammatory conditions of the anus and rectum. The constringent effect of adrenaline on mucous membrane may be prolonged if ephedrine is employed at the same time, as in Nebula Adrenalinæ et Ephedrinæ.

Dose.– 0·0001 to 0·0005 gramme ($\frac{1}{6000}$ to $\frac{1}{1200}$ grain), by subcutaneous injection.

Preparations

Insufflatio Adrenalinæ, B.P.C.—(Insuff. Adrenal.)—Adrenaline Insufflation. *Syn.*—Adrenaline Snuff. Adrenaline, about 1 in 1300, with boric acid, camphor, menthol, potassium chlorate, oil of eucalyptus and lycopodium.

Liquor Adrenalinæ Hydrochloridi, B.P.—(Liq. Adrenal. Hydrochlor.)—Solution of Adrenaline Hydrochloride. *Syn.*—Liquor Adrenalini Hydrochloricus; Hydrochloric Solution of Adrenalin. A sterile preparation containing adrenaline, 1 in 1000, dilute hydrochloric acid, chlorbutol and sodium chloride in distilled water. It should be stored in well-filled, well-closed containers in a cool place away from light. The containers should comply with the tests for limit of alkalinity of glass. Dose.– 0·12 to 0·5 millilitre (2 to 8 minims), by subcutaneous injection.

Nebula Adrenalinæ Aromatica, B.P.C.—(Neb. Adrenal. Aromat.)—Aromatic Adrenaline Spray. *Syn.*—Adrenaline Inhalant; Aromatic Solution of Adrenaline. Adrenaline, 1 in 1000, with acidified dehydrated alcohol, eucalyptol, oil of sweet birch, castor oil and arachis oil.

Nebula Adrenalinæ et Cocainæ, B.P.C.—(Neb. Adrenal. et Cocain.)—Adrenaline and Cocaine Spray. Adrenaline, as solution of adrenaline hydrochloride, 1 in 5000, cocaine hydrochloride, 1 in 100, with chlorbutol and sodium chloride, in distilled water.

Nebula Adrenalinæ et Ephedrinæ, B.P.C.—(Neb. Adrenal. et Ephed.)—Adrenaline and Ephedrine Spray. Adrenaline, as solution of adrenaline hydrochloride, 1 in 8000, and ephedrine hydrochloride, about 1 in 45, with glycerin of phenol and cinnamon water.

Nebula Adrenalinæ et Ephedrinæ Oleosa, B.P.C.—(Neb. Adrenal. et Ephed. Oleos.)—Oily Adrenaline and Ephedrine Spray. Adrenaline, 1 in 10,000, and ephedrine, 1 in 50, with menthol and eucalyptol, in acidified dehydrated alcohol, castor oil and arachis oil.

Suppositorium Adrenalinæ, B.P.C.—(Supp. Adrenal.)—Adrenaline Suppository. Each suppository contains $\frac{1}{60}$ grain of adrenaline.

Suppositorium Adrenalinæ et Cocainæ, B.P.C.—(Supp. Adrenal. et Cocain.)—Adrenaline and Cocaine Suppository. Each suppository contains $\frac{1}{60}$ grain of adrenaline and $\frac{1}{4}$ grain of cocaine hydrochloride.

Unguentum Adrenalinæ, B.P.C.—(Ung. Adrenal.)—Adrenaline Ointment. Adrenaline, 0·1 per cent., as borate, in hydrous wool fat and white soft paraffin.

Unguentum Adrenalinæ et Amylocainæ Compositum, B.P.C.—(Ung. Adrenal. et Amylocain. Co.)—Compound Ointment of Adrenaline and Amylocaine. Adrenaline, 1 in 14,000, as benzoate, amylocaine hydrochloride and benzocaine, of each 1 per cent., and liquid extract of hamamelis, 7·5 per cent. v/w, in wool fat and yellow soft paraffin.

Unguentum Adrenalinæ et Cocainæ, B.P.C.—(Ung. Adrenal. et Cocain.)—Cocaine and Adrenaline Ointment. Adrenaline, 0·1 per cent., as borate, and cocaine hydrochloride, 1 per cent., in hydrous wool fat and white soft paraffin.

ÆTHER
(Æther)

Ether

$C_4H_{10}O = 74·08$

Ether is diethyl ether, $(C_2H_5)_2O$, and may be obtained by the distillation of a mixture of ethyl alcohol and sulphuric acid, and rectification of the distillate. It is a colourless, transparent, very mobile liquid, with a characteristic odour and a sweet burning taste. It is very volatile and inflammable, and mixtures of its vapour with oxygen, nitrous oxide, or air in certain proportions are explosive. The flash-point is about –20° (close test).

Methylated ether for various technical purposes is prepared from duty-free alcohol and subsequently denatured by the addition of wood naphtha, or from industrial methylated spirits. The ether thus obtained is adjusted to the required specific gravity, which varies between wide limits, generally from 0·720 to 0·750, by the addition of alcohol and water in varying proportions. Methylated ether is unsuitable for anæsthetic purposes or oral administration. Ether should be **stored** in well-closed containers, protected from light and in a cool place.

Soluble in water (1 in $8\frac{1}{2}$); miscible in all proportions with alcohol (90 per cent.), chloroform, and fixed and volatile oils.

Standard, B.P.—Ether has a boiling-range of 34° to 36° and a specific gravity of 0·720 to 0·724. Residue on evaporation, not more than 0·002 per cent. w/v. It complies also with limit tests for sulphurous acid and other free acids, and for peroxides.

Action and Uses.—Ether is employed internally for its action on the stomach and circulation. Taken by the mouth, it has a narcotic action somewhat similar to that of alcohol, except that the intoxication comes on and passes away much more rapidly, so that a person may

become intoxicated with ether and recover three or four times a day. In the stomach it acts as a carminative and reflexly excites the heart, but it has little or no direct action on either the heart or blood vessels.

Ether is **administered** in mixtures in the form of Spiritus Ætheris or Spiritus Ætheris Compositus, or in gelatin capsules containing 0·18 or 0·3 millilitre (3 or 5 minims). Hypodermic injections, 1 to 2 millilitres (15 to 30 minims), are used as a restorative in collapse; for this purpose Injectio Camphoræ Ætherea is used. Ether containing one-fourth to one-half its volume of olive oil is administered also as a rectal injection to produce anæsthesia.

As a local anæsthetic the ether spray has been used for small and superficial operations, but its use in this manner has been almost entirely superseded by that of ethyl chloride. Ether is used to cleanse skin areas before surgical operations either alone or in conjunction with soap (Liquor Saponis Æthereus). It is also employed as a menstruum for exhausting such drugs as male fern and capsicum, and as a solvent for oils, resins and many other substances. Ether for **injection** should be filled into sterile containers under aseptic conditions.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Preparations

Injectio Camphoræ Ætherea, B.P.C.—(Inj. Camph. Æther.)—Ethereal Injection of Camphor. *Syn.*—Curs hmann's Solution. Camphor, 1 in 5, and ether, about 1 in 3, in olive oil. Dose.– 0·25 to 1 millilitre (4 to 15 minims), by subcutaneous injection.

Mistura Ætheris cum Ammonia, B.P.C.—(Mist. Æther. c. Ammon.)—Ether Mixture with Ammonia. One fluid ounce contains 30 minims each of spirit of ether and aromatic spirit of ammonia, in camphor water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Spiritus Ætheris, B.P.—(Sp. Æther.)—Spirit of Ether. Ether, 33 per cent. v/v in alcohol (90 per cent.). Specific gravity, 0·802 to 0·806. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Spiritus Ætheris Compositus, B.P.C.—(Sp. Æther. Co.)—Compound Spirit of Ether. *Syn.*—Hoffmann's Anodyne. An alcoholic solution containing about 1 in 8 of ether, with ethyl sulphate and ethyl hydrogen sulphate. Dose.– For a single administration, 4 to 6 millilitres (1 to 1½ fluid drachms); for repeated administration, 1·2 to 2·5 millilitres (20 to 40 minims).

ÆTHER ANÆSTHETICUS

(Æther Anæsth.)

Anæsthetic Ether

Synonyms—Æther Purificatus; Purified Ether.

Anæsthetic ether is a highly purified grade of ether. It should be **stored** in a dry container closed with a well-fitting glass stopper or a cork covered with tin-foil, protected from light and in a cool place.

Standard, B.P.—Anæsthetic ether has a boiling-range of 34° to 35° and a specific gravity of 0·720. No foreign odour is detectable when it is allowed to evaporate spontaneously from filter paper and it complies also with a test for the absence of methyl alcohol and with limit tests for peroxides and for acetone and aldehyde.

Action and Uses.—Anæsthetic ether is employed for inhalation as a general anæsthetic. For this purpose, it is only about one-fourth as toxic to the central nervous system as chloroform. The cases of sudden death from vagal stimulation in the early stages of chloroform narcosis are unknown in ether narcosis. The disadvantages of ether are the time taken in inducing anæsthesia, the stage of excitement being especially prolonged, and its irritation to the bronchial mucous membrane. A hypodermic injection of atropine, with or without morphine and hyoscine, is frequently given before administration of ether. When employed as a general anæsthetic, its use is sometimes preceded by administration of nitrous oxide.

ÆTHYLENI DICHLORIDUM

(Æthylen. Dichlor.)

Ethylene Dichloride

$C_2H_4Cl_2 = 98·95$

Synonym—Dichlorethane.

Ethylene dichloride, $(CH_2Cl)_2$, may be prepared by passing ethylene into a slightly warmed mixture of 2 parts of manganese dioxide, 3 parts of sodium chloride, 4 parts of water and 5 parts of sulphuric acid. It may be purified by washing with a dilute solution of sodium carbonate, drying over calcium chloride and distilling. It is a mobile liquid, with an ethereal odour and sweetish taste. Ethylene dichloride dissolves iodine, forming a reddish-violet solution. It does not decolourise potassium permanganate solution. It boils at about 84° and has a specific gravity of about 1·26.

Soluble in water (about 1 in 120).

Action and Uses.—Ethylene dichloride is employed as a solvent; a solution of iodine, 1 in 40, in ethylene dichloride has been used as an application to the skin in place of weak solution of iodine.

ÆTHYLENI DIBROMIDUM.—Ethylene dibromide, $(CH_2Br)_2$, may be prepared by heating ethyl bromide with bromine in the presence of iron wire, or by the combination of ethylene with bromine, and occurs as a heavy, colourless liquid with a characteristic odour. When placed in a freezing mixture it solidifies, melting again at about 9°; boiling-point, about 131°; specific gravity, about 2·18. It is slightly soluble in water and miscible with alcohol, ether and oils.

ÆTHYLENUM
(Æthylen.)
Ethylene
$C_2H_4 = 28{\cdot}03$

Ethylene, $CH_2{:}CH_2$, may be obtained from the decomposition products of petroleum and is usually supplied compressed in metal cylinders. It is a colourless gas with a faint, sweetish odour and taste, burning in air with a luminous flame and forming explosive mixtures with various proportions of air or oxygen. It is absorbed slowly by sulphuric acid but rapidly by fuming sulphuric acid with formation of ethyl hydrogen sulphate, $(C_2H_5)HSO_4$; it is also absorbed by potassium permanganate solution with formation of ethylene glycol, $C_2H_4(OH)_2$, and it discharges the colour of bromine water.

Slightly **soluble** in water (1 in 9·2 at 25°); soluble in alcohol (95 per cent.) (2 in 1 at 25°) and ether (20 in 1 at 15·5°).

Standard, B.P.—Ethylene contains not less than 98 per cent. v/v of C_2H_4. It complies with tests for the absence of carbon monoxide and with limit tests for carbon dioxide, acid and sulphur dioxide, and for acetylene, phosphine, aldehydes and hydrogen sulphide.

Action and Uses.—As a general anæsthetic, ethylene is administered in admixture with oxygen in the proportion of 80 to 90 per cent. of ethylene. Anæsthesia is quickly produced without any respiratory difficulty, and, on withdrawing the anæsthetic, recovery is rapid, the patient generally waking without excitement and with comparatively little tendency to vomit. Ethylene-oxygen anæsthesia is suitable for most major operations since the muscular relaxation produced is superior to that obtained by nitrous oxide-oxygen, but not so complete as that produced by ether. For this reason it is necessary to supplement its action with a small amount of ether when operating on the upper abdomen. The general tissues of the body are unaffected by its use, and it produces no alteration in the clotting time of the blood. The undesirable effect on kidney function is less than that of ether, and there is a marked absence of post-operative pneumonia. It is considered the best anæsthetic for cases attended with risk. The disadvantage of ethylene is the danger of fire or explosion. Consequently it should not be used in the neighbourhood of a naked flame or in operations where cautery, diathermy or any form of electric apparatus which produces a spark is to be employed. Ethylene is also used for ripening fruit during transit. Fruit so ripened does not contain the same amount of vitamins as that which is ripened naturally, but the vitamins already present are not affected.

ACETYLENUM.—A mixture of acetylene, CH : CH, 40 to 80 per cent., with oxygen has been suggested as a general anæsthetic. It is considered to be rapid and safe in its action, but the dangers of explosion impose considerable limits on its use.

ÆTHYLHYDROCUPREINÆ HYDROCHLORIDUM

(Æthylhydrocuprein. Hydrochlor.)

Ethylhydrocupreine Hydrochloride

$C_{21}H_{28}O_2N_2,HCl = 376{\cdot}7$

Ethylhydrocupreine hydrochloride is the hydrochloride of an alkaloid which may be prepared synthetically by the ethylation of the hydrocupreine produced by the demethylation of hydroquinine, the product of the hydrogenation of quinine. It occurs as a white, crystalline powder, with a very bitter taste and melting at about 240°.

Readily **soluble** in water, alcohol and chloroform.

Standard.—Ethylhydrocupreine hydrochloride contains not less than 90 per cent. of $C_{21}H_{28}O_2N_2$. On the addition of excess of sodium hydroxide solution to 0·5 gramme in 5 millilitres of water, a white, curdy precipitate is produced (distinction from hydrocupreine). On the addition of 0·3 millilitre of N/10 potassium permanganate to 0·1 gramme, dissolved in 20 millilitres of water at 15°, a violet colour is produced and persists for at least one minute (limit of quinine and other impurities). 0·5 gramme dissolves in 1 millilitre of sulphuric acid with not more than a slightly greenish-yellow colour (limit of organic impurities).

Assay.—Dissolve about 0·5 gramme, accurately weighed, in 20 millilitres of water in a separator, make slightly alkaline with dilute solution of ammonia and completely extract with successive portions of chloroform, passing each portion of chloroform through 10 millilitres of water contained in a second separator; evaporate the combined chloroform extracts, add 2 millilitres of alcohol and again evaporate; dry the residue of $C_{21}H_{28}O_2N_2$ to constant weight at 100°.

Action and Uses.—Ethylhydrocupreine hydrochloride exerts a specific bactericidal action upon the pneumococcus and is used for local application in the treatment of pneumococcal infections of the eyes, where it is said to be capable of killing the pneumococcus in the substance of the cornea without injuring the cornea itself. It is not suitable for oral administration in the treatment of pneumonia; for this purpose, ethylhydrocupreine base is employed. A solution containing 1 or 2 per cent. of ethylhydrocupreine hydrochloride may be instilled into the conjunctival sac, or an ointment with atropine sulphate in yellow soft paraffin may be applied. The first application of the solution is often painful, but anæsthesia develops in from two to thirty seconds, and persists sufficiently long to prevent discomfort from subsequent applications. Ethylhydrocupreine is employed as a prophylactic against infection after injuries to the eye involving laceration of the cornea. It may also be used in 0·01 per cent. w/v solution in water as a mouth-wash or gargle. Solutions for **injection** may be sterilised by tyndallisation or by filtration. The containers must comply with the tests for limit of alkalinity of glass, and the solution should be stored protected from light.

ÆTHYLHYDROCUPREINA.—Ethylhydrocupreine, $C_{21}H_{25}O_2N_2$, occurs as a white powder or in minute crystals, melting at about 124°, readily soluble in alcohol, chloroform, ether and dilute acid, and insoluble in water. Ethylhydrocupreine exerts a powerful and selectively specific bactericidal action against all four types of the pneumococcus, and has been recommended for use as a curative agent in pneumococcal infection and as a prophylactic in impending pneumonia. It kills the pneumococcus in a dilution of 1 in 400,000 *in vitro*, but for other bacteria the solution must be from 100 to 1000 times stronger to produce a comparable effect. Following oral administration of ethylhydrocupreine the blood serum acquires pneumococcicidal properties. Ethylhydrocupreine base, but not the hydrochloride, is suitable for use in the treatment of pneumonia. Treatment should be commenced if possible within forty-eight hours after the initial symptoms. For adults, doses of 0·25 gramme (4 grains) should be given orally at intervals of five hours night and day for three days only, and 5 ounces of milk given with each dose. Patients who exhibit an idiosyncrasy towards quinine may show a similar idiosyncrasy towards ethylhydrocupreine. Disturbances of hearing, such as a ringing in the ears, or dulled vision are indications for its discontinuance. The administration of milk with each dose serves not only to supply nourishment, but also to utilise free hydrochloric acid in the stomach, thereby retarding the too rapid conversion of the base into the more soluble hydrochloride. In this way the rate of absorption is so controlled that an optimum concentration is more easily maintained in the blood. The administration of ethylhydrocupreine requires caution since large doses or continued administration may cause optic atrophy; the vision should be carefully tested throughout the treatment. Dose.– 0·25 gramme (4 grains).

AMYLHYDROCUPREINÆ DIHYDROCHLORIDUM.—*iso*Amylhydrocupreine dihydrochloride, $C_{24}H_{34}O_2N_2,2HCl$, is the salt of the synthetic base. It is a white, crystalline powder, sparingly soluble in water and readily soluble in alcohol. It has been suggested for use as an antiseptic and anæsthetic in diphtheria and other affections of the nose and throat, and for anæsthesia of the bladder.

OCTYLHYDROCUPREINÆ DIHYDROCHLORIDUM.— *iso*Octylhydrocupreine dihydrochloride, $C_{27}H_{43}O_2N_2,2HCl$, is the salt of the synthetic base. It is a white powder, sparingly soluble in water and soluble in alcohol. It is suggested as a disinfectant for wounds and is used in solution containing 0·5 to 1 per cent. w/v.

ÆTHYLIS ACETAS

(Æthyl. Acet.)

Ethyl Acetate

Synonyms—Æther Aceticus; Acetic Ether.

$C_4H_8O_2 = 88·06$

Ethyl acetate, $CH_3{\cdot}COOC_2H_5$, mixed with small quantities of alcohol and other substances, is obtained by distilling ethyl alcohol, sulphuric acid and acetic acid, and purifying the product. It occurs as a colourless liquid, with a characteristic, fragrant odour. In the presence of water it becomes partially hydrolysed with formation of ethyl alcohol and acetic acid; conversely, it is produced in mixtures containing alcohol and acetic acid. Ethyl acetate prepared from industrial methylated spirit is used as a solvent, for technical purposes. It should be **stored** in well-stoppered bottles.

Soluble in water (1 in 15); miscible with alcohol, ether and chloroform.

Standard.—Ethyl acetate contains not less than 90 per cent. w/w of $C_4H_8O_2$. Specific gravity, 0·900 to 0·907. Residue on evaporation, not more than 0·05 per cent. Moistened blue litmus paper, introduced into the liquid, is not immediately reddened (limit of free acid). When carefully poured over sulphuric acid in a test tube, no dark ring is formed at the point of contact within fifteen minutes (limit of readily carbonisable substances). Mix about 2 millilitres with 20 millilitres of sodium hydroxide solution and distil 5 millilitres; the distillate complies with the limit test for methyl alcohol in Alcohol.

Assay.—Weigh accurately about 5 grammes in a tared flask and dilute to 100 millilitres with water. Take 10 millilitres of this solution and neutralise with N/1 sodium hydroxide, using phenolphthalein as indicator; add 20 millilitres of N/1 sodium hydroxide, mix, set aside for thirty minutes, and titrate with N/1 sulphuric acid; each millilitre of N/1 sodium hydroxide is equivalent to 0·08806 gramme of $C_4H_8O_2$.

Action and Uses.—Ethyl acetate is carminative, antispasmodic and diaphoretic, but is seldom given internally. For inhalation in laryngeal catarrh, 2 millilitres (½ fluid drachm) is added to 600 millilitres (1 pint) of water at 60°. Ethyl acetate is widely used as a solvent.

Dose.—For repeated administration, 1 to 2 millilitres (¼ to ½ fluid drachm); for a single administration, 3 to 4 millilitres (¾ to 1 fluid drachm).

BENZYLIS ACETAS.—Benzyl acetate, $CH_3{\cdot}COOCH_2{\cdot}C_6H_5$, is present in the oils of hyacinth, jasmin and other flowers and may be obtained by the acetylation of benzyl alcohol. It occurs as a colourless liquid with a sweet, jasmin-like odour, having a specific gravity of about 1·06 and a boiling-point of about 216°. It is used in perfumery.

BUTYLIS ACETAS.—*n*-Butyl acetate, $CH_3{\cdot}COO(CH_2)_3CH_3$, may be prepared by the acetylation of butyl alcohol and occurs as a colourless, non-toxic liquid having an odour similar to, but less pronounced than, that of amyl acetate. It has a specific gravity of about 0·875 to 0·890 and a boiling-range of about 110° to 130°. It is miscible with oils and hydrocarbons, and is used as a solvent in the manufacture of lacquers and varnishes.

ÆTHYLIS BROMIDUM

(Æthyl. Brom.)

Ethyl Bromide

$C_2H_5Br = 109{\cdot}0$

Ethyl bromide may be prepared by distilling a mixture of alcohol, potassium bromide and sulphuric acid. To prevent decomposition about 1 per cent. of alcohol is added to the purified product. It occurs as a clear, colourless, strongly refracting, neutral liquid, with a pleasant, ethereal odour and a sweetish, warm taste. Boiling-point, about 38°. It is decomposed by exposure to air and sunlight, and should be **stored** in well-closed bottles in a dark place.

Soluble in water (about 1 in 100), alcohol and ether.

Standard.—Ethyl bromide has a specific gravity of 1·453 to 1·457. Sulphuric acid, shaken with an equal volume of ethyl bromide in a glass-stoppered vessel and allowed to stand for one hour in the dark, does not acquire a yellow colour (limit of foreign organic matter). When allowed to evaporate spontaneously, no foreign odour is perceptible and no appreciable residue remains (limit of phosphorus compounds). When 10 millilitres is shaken with 10 millilitres of 20 per cent. cadmium iodide solution and 1 millilitre of starch mucilage, no colour is produced in either layer (limit of free bromine). When 5 millilitres is shaken with 5 millilitres of water, and the water separated, not more than 0·5 millilitre of N/10 sodium hydroxide is required to neutralise the aqueous solution to phenolphthalein (limit of hydrobromic acid).

Action and Uses.—Ethyl bromide has been used instead of chloroform as an anæsthetic in short operations. Consciousness returns very rapidly, but there is sometimes an after-feeling of discomfort. It may seriously depress the respiration and several deaths have resulted from its use as an anæsthetic.

ÆTHYLIS IODIDUM.—Ethyl iodide, C_2H_5I, occurs as a clear, colourless, mobile liquid, with a pleasant, ethereal odour, and a pungent taste. It is decomposed on exposure to air and sunlight, and should be stored in well-closed bottles in a dark place. Boiling-point, 71° to 72°; specific gravity, about 1·943. It is soluble in water (1 in 440), and miscible in all proportions with alcohol and ether. Ethyl iodide has been used alone or with two parts of chloroform for inhalation to relieve the dyspnœa of bronchial asthma and œdematous laryngitis. Dose.– 0·2 to 0·3 millilitre (3 to 5 minims), by inhalation.

ÆTHYLIS CHLORIDUM

(Æthyl. Chlor.)

Ethyl Chloride

$C_2H_5Cl = 64·50$

Ethyl chloride or monochlorethane, $CH_3 \cdot CH_2Cl$, may be prepared by the action of hydrogen chloride on ethyl alcohol or on industrial methylated spirit; if prepared from methylated spirit it will contain a small proportion of methyl chloride. It occurs as a gas at ordinary temperatures and pressures, but is liquefied by slight compression, forming a colourless, mobile and very volatile liquid, in which form it is usually supplied; under normal pressure the liquid boils at about 12·5° and has a specific gravity (0°/15·5°) of about 0·921. It has a pleasant, ethereal odour and a sweetish, burning taste. It is highly inflammable, burning with a smoky, green-edged flame. Ethyl chloride may be identified by hydrolysis with sodium hydroxide, when sodium chloride and ethyl alcohol are formed. The official assay gives very low

results; accurate results may be obtained by using an excess of N/1 alcoholic potassium hydroxide and making a blank experiment.

Slightly **soluble** in water; miscible with alcohol (90 per cent.) and ether.

Standard, B.P.—Ethyl chloride contains the equivalent of not less than 99·5 per cent. w/w of C_2H_5Cl. Residue on evaporation, not more than 0·01 per cent. During evaporation no foreign odour is at any time detectable. It complies also with limit tests for acid, alkali, ionisable chlorides and ethyl alcohol.

Action and Uses.—Ethyl chloride is largely used to produce local or general anæsthesia in minor surgery. For local use, the tubes in which the liquid is stored are provided with a tap by which a fine jet of the liquid is directed upon the part, at a distance of six to eight inches. For general anæsthesia, the vapour volatilising from the liquid is inhaled through a mask and sometimes perfumed with cologne essence. Anæsthesia is rapid, but difficult to maintain for long with safety. Ethyl chloride has been recommended for use in place of nitrous oxide, and it is sometimes used to produce primary anæsthesia before giving ether or chloroform, especially to children. For a sedative inhalation, glass capsules encased in silk are prepared containing 0·3 millilitre (5 minims) in each. In cases of collapse from administration of ethyl chloride the restorative measures recommended under Chloroformum should be applied.

METHYLIS CHLORIDUM.—Methyl chloride, CH_3Cl, occurs, in the compressed state, as a colourless liquid having an ethereal odour and a sweet taste. At about −25° it has a specific gravity of 0 991; boiling-point, about −21°. It is soluble in water, more so in alcohol and freely in ether and chloroform. Methyl chloride is occasionally used to produce local anæsthesia, the spray being directed obliquely upon the part, which may be partly protected by a thin layer of cotton wool, as the liquid is liable to cause blisters. In neuralgia, sciatica and lumbago, cotton wool soaked in liquid methyl chloride may be applied to the seat of pain. On account of its action on the skin, however, pure methyl chloride is not much used as a local anæsthetic; a mixture of methyl and ethyl chlorides, which is free from this disadvantage, is sometimes used.

ÆTHYLMORPHINÆ HYDROCHLORIDUM

(Æthylmorph. Hydrochlor.)

Ethylmorphine Hydrochloride

$C_{19}H_{23}O_3N,HCl,2H_2O = 385·7$

Ethylmorphine hydrochloride may be obtained by the action of diethyl sulphate on morphine in alkaline alcoholic solution, the ethylmorphine formed being neutralised with hydrochloric acid. It occurs as a white, odourless, minutely crystalline powder, having a bitter taste. Its aqueous solution is precipitated by the usual alkaloidal reagents. Melting-point, about 123°. The addition of one drop of

ferric chloride solution to a solution of 0·01 gramme in 10 millilitres of sulphuric acid, produces on warming a violet or blue colouration, and the further addition of one drop of nitric acid changes it to deep red.

Soluble in water (about 1 in 10), alcohol (about 1 in 25), warm alcohol (about 1 in 1); almost insoluble in ether and chloroform.

Standard.—Ethylmorphine hydrochloride loses, on drying at 100°, not more than 10 per cent. of its weight. Ash, not more than 0·1 per cent. A solution in water (1 in 20) is neutral to litmus paper. On the addition of 1 millilitre of dilute solution of ammonia to 5 millilitres of a 4 per cent. w/v solution in water, a white turbidity is immediately produced (distinction from codeine hydrochloride). To 5 millilitres of a 2 per cent. w/v solution in N/10 hydrochloric acid add 2 millilitres of a 1 per cent. w/v solution of sodium nitrite in water and then 3 millilitres of dilute solution of ammonia; the yellow colour produced is not deeper than that obtained when 5 millilitres of a 0·002 per cent. w/v solution of anhydrous morphine in N/10 hydrochloric acid is similarly treated (limit of morphine).

Action and Uses.—Ethylmorphine hydrochloride is intermediate in its properties between morphine and codeine. It does not depress the respiratory centre to the same extent as does morphine. It is employed to allay cough in bronchitis, bronchial asthma and whooping cough, but is inferior to diamorphine. It is narcotic and sedative, and is sometimes employed for ulcer and cancer of the stomach and bowel when morphine causes nausea. It is employed in ophthalmic practice as an analgesic in corneal ulceration, iritis and glaucoma (1 to 5 per cent. solution). Its use may at first cause a sharp burning sensation and some œdema of the conjunctiva, which, however, soon subsides. It may be **administered** as an elixir or in pills. Solutions for **injection** may be sterilised by tyndallisation or by filtration. The containers must comply with the tests for limit of alkalinity of glass, and the solution should be stored protected from light.

Dose.– 0·006 to 0·03 gramme ($\frac{1}{10}$ to $\frac{1}{2}$ grain), by the mouth; 0·0025 to 0·008 gramme ($\frac{1}{24}$ to $\frac{1}{8}$ grain), by hypodermic injection.

BENZYLMORPHINÆ HYDROCHLORIDUM.—Benzylmorphine hydrochloride, $C_{17}H_{18}O_2N(OCH_2C_6H_5)$, HCl, is a salt of a base formed by the action of benzyl chloride on morphine. It occurs as a colourless, microcrystalline powder, having a bitter taste. This ether must not be confused with the ester, benzoylmorphine. Benzylmorphine hydrochloride is soluble in water (1 in 200), in alcohol (1 in 160), but insoluble in ether and chloroform. Benzylmorphine has properties closely resembling those of codeine and ethylmorphine, and may be used for local irritation of the respiratory organs. It is generally administered for this purpose in solution with expectorants. Dose.– 0·008 to 0·03 gramme ($\frac{1}{8}$ to $\frac{1}{2}$ grain).

Preparation

Elixir Æthylmorphinæ et Terpini, B.P.C.—(Elix. Æthylmorph. et Terpin.)—Elixir of Ethylmorphine and Terpin. Each fluid drachm contains approximately $\frac{1}{2}$ grain of ethylmorphine hydrochloride and $\frac{1}{8}$ grain of terpin hydrate, with alcohol (90 per cent), glycerin and syrup of wild cherry. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

AGAR
(Agar)
Agar

Synonyms—Agar-Agar; Japanese Isinglass.

Agar is the solid residue obtained by concentrating a decoction prepared from *Gelidium corneum* (Huds.) Lamouroux, *G. cartilagineum* Gaill. (Fam. Gelidiaceæ) and other algæ belonging to the Rhodophyceæ. The seaweeds are collected chiefly off the coast of Japan, bleached by exposure to the sun and boiled in slightly acidulated water. The strained decoction is exposed to a low atmospheric temperature to freeze out the water and the gelatinous slabs so produced are cut up, converted into fine strips by forcing them through wire netting, and dried.

Agar occurs as thin, translucent strips about 60 centimetres long and 4 millimetres wide, of a greyish-white colour, with a somewhat crinkled and micaceous surface, or as flattened bands about 30 centimetres long and 2·5 centimetres wide and of a yellowish colour. On hydrolysis with 5 per cent. v/v sulphuric acid, agar yields galactose which reduces Fehling's solution, thus distinguishing it from gelatin and isinglass. The latter substances yield ammonia when heated with soda lime, a reaction which is not given by agar. A nearly boiling 0·2 per cent. solution of agar in water gives with solution of tannic acid a faint opalescence but no precipitate; a similar cold solution, however, yields a precipitate with solution of tannic acid. One drop of N/10 iodine added to 10 millilitres of a rapidly cooled 0·2 per cent. aqueous solution produces a pale yellowish colour, while 0·5 millilitre added to a similar solution yields a dark purple colouration; when the hot solution is allowed to cool slowly and 0·5 millilitre of N/10 iodine is added after the solution has been set aside for two hours, a brownish colour is produced. The residue obtained by treating the ash, particularly of strip agar, with hydrochloric acid exhibits, when viewed microscopically, particles of sand, sponge spicules and diatoms, of which the disc-shaped species, *Arachnoidiscus Ehrenbergii* Baill., is one of the best known. When immersed in cold water, agar swells to a gelatinous mass, but does not dissolve; a 1 per cent. solution in water forms a firm jelly.

Agar **contains** the carbohydrate, gelose, in combination with calcium and sulphuric acid in the form of an ethereal sulphate. Agar also contains small traces of boron and arsenic.

Standard, B.P.—Agar yields not more than 5 per cent. of ash.

Agar, in powder (Pulvis Agar : Pulv. Agar), contains the constituents and possesses the properties of Agar, and complies with the standard for the unground drug. When viewed microscopically, it shows translucent rounded or angular fragments; no starch grains are present.

Action and Uses.—Agar has little nutritive value; it is not attacked by the digestive secretions and passes through the intestine almost

unchanged. It absorbs and retains moisture, increasing very largely in bulk, and, owing to this property, it is used with success in chronic constipation with intestinal atony. It renders the fæces soft and bulky and promotes peristalsis. Emulsions containing agar with liquid paraffin, phenolphthalein and magnesium hydroxide are also used. When agar is to be taken by itself, small shreds mixed with fruit, milk, etc., are preferable. A jelly for invalids may be made by dissolving 1 part of agar in 200 parts of boiling water and allowing to cool. Biscuits made from a mixture of agar and bran are given to diabetic patients. Agar is employed for preparing culture media for use in bacteriology; it has also been recommended as a substitute for gelatin in making suppositories and for use as an emulsifying agent.

Dose.– 4 to 16 grammes (1 to 4 drachms).

Preparations

Emulsio Paraffini Liquidi Composita, B.P.C.—(Emuls. Paraff. Liq. Co.)—Compound Emulsion of Liquid Paraffin. *Syn.*—Emulsion of Liquid Paraffin with Agar and Phenolphthalein. Emulsion of liquid paraffin with agar, containing 1½ grains of phenolphthalein in each fluid ounce. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Emulsio Paraffini Liquidi cum Agar, B.P.C.—(Emuls. Paraff. Liq. c. Agar)—Emulsion of Liquid Paraffin with Agar. It contains 50 per cent. v/v of liquid paraffin, with agar. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

AGARICUS
(Agaric.)

Agaric

Synonyms—White Agaric; Larch Agaric; Purging Agaric; Boletus Laricis.

Agaric is the dried fungus, *Fomes officinalis* Faull. (Fam. Polyporaceæ), which grows in Europe and Northern Asia upon *Larix sibirica* Led., *L. europœa* DC., and other species of *Larix* (Fam. Pinaceæ). It is collected in August and September, chiefly in the larch forests of the French Alps and Southern Tyrol, and near Archangel; it is dried and bleached in the sun. Agaric should not be confused with the poisonous fly agaric, *Amanita muscaria* Pers., which is the Agaricus of the Homœopathic Pharmacopœia.

The fungus occurs in spongy, resinous masses of irregular shape, brownish externally and yellowish-white internally. The pieces are friable, not easily powdered in a mortar, but can be disintegrated by rubbing through a sieve. The odour is faint and meal-like and the taste sweetish, afterwards acrid and bitter, resembling that of quinine. Microscopically it consists of long, slender, interlacing hyphæ 3 to 5 microns wide, with occasional enlargements and calcareous particles of irregular shape, and a few prismatic crystals of calcium oxalate.

Agaric **contains** agaric acid, agaricol, a phytosterol, ricinoleic acid, cetyl alcohol, and several resinous principles.

Standard.—Acid-insoluble ash, not more than 2 per cent.

Action and Uses.—Agaric is an irritant and may cause nausea, vomiting and purging. It is used in the preparation of Tinctura Antiperiodica.

Dose.—0·2 to 2 grammes (3 to 30 grains).

AGROPYRUM
(Agropyr.)

Couch Grass

Synonyms—Triticum; Triticum repens.

Couch grass is the rhizome of *Agropyron repens* Beauvois (Fam Gramineæ), a weed abundant in Europe, Northern Asia, Australia and America. It is gathered in the spring, deprived of its roots, cut into short lengths and dried.

The rhizome occurs in short, straight pieces, hollow except at the nodes, about 3 to 20 millimetres long and 2 to 3 millimetres in diameter, straw-coloured, lustrous and strongly furrowed longitudinally At the nodes are small, circular, root scars and somewhat larger stem scars; very short pieces of stem or root are sometimes attached. It has no odour and possesses a faint, sweetish taste. A transverse section is circular in outline.

The diagnostic **microscopical** characters are the narrow hypodermal band of sclerenchyma; nearer the centre, a wide band of sclerenchyma in which the principal vascular bundles are embedded; in surface view, the epidermis which consists of wavy-walled rectangular cells in parallel rows, in which long cells alternate with small twin cells. The twin cells are together about one-tenth the length of a long cell, the latter being about eleven times as long as it is broad.

Couch grass **contains** triticin (a carbohydrate resembling inulin), dextrose, mucilage, mannitol and inositol. Triticin yields lævulose on hydrolysis. The medicinal activity cannot be attributed to any known constituent.

Substitutes.—The rhizome of *Cynodon Dactylon* Persoon (Dog-grass), has been substituted wholly or in part for the genuine drug; it may be recognised by the presence of abundant starch and the absence of hypodermal sclerenchyma.

Standard.—Couch grass contains not more than 2 per cent. of foreign organic matter. Acid-insoluble ash, not more than 3 per cent.

Couch grass, in powder (Pulvis Agropyri : Pulv. Agropyr.), contains the constituents and possesses the diagnostic microscopical characters of Agropyrum, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Couch grass is a demulcent diuretic and is used internally in the treatment of catarrhal diseases of the genito-urinary tract, in the form of the liquid extract or decoction. The latter is a suitable vehicle for bladder sedatives and antiseptics.

Preparations

Decoctum Agropyri, B.P.C.—(Dec. Agropyr.)—Decoction of Couch Grass. *Syn.*—Decoction of Triticum. 1 in 20. Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

This decoction was included in the British Pharmacopœia, 1914.

Extractum Agropyri Liquidum, B.P.C.—(Ext. Agropyr. Liq.)—Liquid Extract of Couch Grass. *Syn.*—Liquid Extract of Triticum. 1 in 1. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

This liquid extract was included in the British Pharmacopœia, 1914.

ALBUMEN
(Albumen)

Albumen

Synonyms—Egg Albumen; White of Egg.

Albumen is the liquid white of the egg of *Gallus bankiva* var. *domesticus* (Order Gallinæ). It occurs as a nearly colourless or pale-yellow fluid contained in a network of fibrinous material which is broken up by beating. Albumen should be free from unpleasant odour, and faintly alkaline to litmus. It has a specific gravity of about 1·045 and contains about 13 per cent. of solid matter of which about 12 per cent. is protein. The organic solids contain about 15·5 per cent. of nitrogen and 1·6 per cent. of sulphur. Of the protein, about 6·7 per cent. is globulin (ovoglobulin) and is precipitated by half-saturation with ammonium sulphate; the albumin (ovalbumin) remaining in solution may be salted out by complete saturation with ammonium sulphate.

Albumen is coagulated when heated to about 70°, the temperature of coagulation being influenced by a number of factors, including the rate of heating, the reaction of the solution, and the concentration of electrolytes present. Albumen is coagulated by alcohol. It is precipitated by most mineral acids and some organic acids, but not by phosphoric or acetic acids. It is soluble in caustic alkalis, but forms precipitates with the salts of most of the heavy metals. It is precipitated also by volatile oils, camphor, phenol and tannic acid. Fresh white of egg contains the growth-promoting vitamin B_2, but is lacking in the anti-neuritic vitamin B_1.

Action and Uses.—A solution of albumen made by dissolving the white of one egg in 150 millilitres (5 fluid ounces) of boiled and cooled water, adding salt to taste, and a little brandy if necessary, is used in the diarrhœa of infants. Albumen is used as an antidote to poisoning by mercuric chloride and soluble salts of other heavy metals. It

is also used as a clarifying agent for culture media and gelatin solutions.

ALBUMEN SICCUM.—Dried albumen may be obtained by careful evaporation of white of egg on glass plates at a temperature not above 50°. It occurs as yellowish, transparent flakes or scales of a horny consistence, or as a coarse powder. It slowly dissolves in about 10 parts of water, being more readily soluble in the presence of a little sodium chloride. forming a solution which may be substituted for white of egg. Dried albumen is used as a protective in colloidal solutions.

OVI VITELLUS.—Yolk of egg is the membranous sac, enclosing a yellow or reddish-yellow, opaque, odourless liquid with a slightly alkaline reaction. The liquid contains about 50 per cent. of water and 20 per cent. of oil, emulsified by the presence of about 7 per cent. of lecithin and 15 per cent. of the protein vitellin. Yolk of egg contains vitamins A, B_1, and B_2. It is employed as an emulsifying agent for oils, being particularly useful in the case of oil of turpentine and other volatile oils.

ALCOHOL

(Alcoh.)

Alcohol (95 per cent.)

Alcohol (95 per cent.) is a mixture of ethyl alcohol, C_2H_5OH, and water obtained by the distillation of fermented saccharine liquids. It occurs as a transparent, colourless, mobile, volatile liquid with a characteristic odour and a burning taste; it is highly inflammable, burning with a blue, smokeless flame.

Miscible in all proportions with water, contraction in volume and rise of temperature occurring, and with ether and chloroform.

Standard, B.P.—Alcohol (95 per cent.) contains not less than 94·7 per cent. v/v or 92·0 per cent. w/w and not more than 95·2 per cent. v/v or 92·7 per cent. w/w of C_2H_6O. Specific gravity, 0·815 to 0·817. Residue on evaporation and drying at 100°, not more than 0·01 per cent. w/v. Refractive index at 20°, 1·3637 to 1·3639. It complies with limit tests for acidity, alkalinity, oily or resinous substances, fusel oil and allied impurities, and aldehyde; it complies also with a test for the absence of methyl alcohol.

DILUTE ALCOHOLS.—Dilute alcohols of various strengths may be prepared by diluting alcohol (95 per cent.) with distilled water in the proportions stated below. Before the final adjustment of volume is made, the mixture is cooled to the same temperature, about 15°, as that at which the alcohol (95 per cent.) is measured. The dilute alcohols comply with the chemical tests for purity of the British Pharmacopœia given under Alcohol, and with specified limits for specific gravity and refractive index.

Alcohol (90 *per cent.*)—(Spiritus Rectificatus; Rectified Spirit). Dilute 948 millilitres of alcohol (95 per cent.) to 1 litre with distilled water. It contains not less than 89·6 per cent. v/v and not more than 90·5 per cent. v/v of C_2H_6O.

Alcohol (80 *per cent.*)—Dilute 842 millilitres of alcohol (95 per cent.) to 1 litre with distilled water. It contains not less than 79·5 per cent. v/v and not more than 80·3 per cent. v/v of C_2H_6O.

Alcohol (70 *per cent.*).—Dilute 737 millilitres of alcohol (95 per cent.) to 1 litre with distilled water. It contains not less than 69·5 per cent. v/v and not more than 70·4 per cent. v/v of C_2H_6O.

Alcohol (60 *per cent*).—Dilute 632 millilitres of alcohol (95 per cent.) to 1 litre with distilled water. It contains not less than 59·7 per cent. v/v and not more than 60·2 per cent. v/v of C_2H_6O.

Alcohol (50 *per cent*).—Dilute 526 millilitres of alcohol (95 per cent.) to 1 litre with distilled water. It contains not less than 49·6 per cent. v/v and not more than 50·2 per cent. v/v of C_2H_6O.

Alcohol (45 *per cent.*)—Dilute 474 millilitres of alcohol (95 per cent.) to 1 litre with distilled water. It contains not less than 44·7 per cent. v/v and not more than 45·3 per cent. v/v of C_2H_6O.

Alcohol (25 *per cent.*).—Dilute 263 millilitres of alcohol (95 per cent.) to 1 litre with distilled water. It contains not less than 24·6 per cent. v/v and not more than 25·4 per cent. v/v of C_2H_6O.

Alcohol (20 *per cent.*)—Dilute 210 millilitres of alcohol (95 per cent.) to 1 litre with distilled water. It contains not less than 19·5 per cent. v/v and not more than 20·5 per cent. v/v of C_2H_6O.

PROOF SPIRIT—Proof spirit (Spiritus Tenuior) has a specific gravity of 0·9198 and contains about 57·1 per cent. v/v or 49·2 per cent. w/w of C_2H_6O. Spirits are described as so many degrees over or under proof (*o.p.* or *u.p.*) according to the quantity of distilled water which must be added to, or deducted from, 100 volumes of the sample in order to produce spirit of proof strength. Alcohol (90 per cent.) corresponds very nearly to 58 over proof and 100 volumes thus contain almost as much C_2H_6O as 158 volumes of proof spirit.

Action and Uses.—Alcohol produces a purely depressant action on the central nervous system and not, as was formerly supposed, a stimulant effect. This is explained by the fact that the higher centres are inhibitory in action: hence alcohol tends to remove such characteristics as hesitancy, circumspection and self-criticism. Alcohol acts on the digestive system by causing reflexly an increased flow of saliva and gastric juice. It also increases the flow of gastric juice by a direct action on the fundus of the stomach, and further aids digestion by inhibiting unpleasant emotions such as worry or anger. Concentrated solutions of alcohol, however, if taken habitually, produce chronic gastritis with diminished gastic secretion. The clinical picture of cirrhosis of the liver may appear later.

Because of its rapid absorption, alcohol is a valuable food and is used therefore in fevers when the assimilation of ordinary foods is impaired. It should be given in small and repeated doses in order to avoid its action as a tissue poison. Alcohol produces dilatation of the vessels supplying the skin and mucous membranes. Its use should therefore be avoided by those exposed to cold, although it may be of value for restoring the circulation after exposure to cold. It is a hypnotic when given in quiet surroundings conducive to sleep. In the treatment of acute infections, such as pneumonia and septicæmia, alcohol is considered to be of service. Alcohol (80 per cent.), injected into the Gasserian ganglion, is helpful in the treatment of intractable trigeminal neuralgia. Alcohol is excreted partly by the lungs and partly by the kidneys. Chemical estimations of alcohol in the blood, urine, or breath, are sometimes utilised as a test for drunkenness. In the treatment of acute alcoholism the stomach pump should be employed, the stomach being well washed out, and a pint of warm sodium bicarbonate solution left in it. The patient should be kept warm. In chronic alcoholism

in its various manifestations, the only effective action is institutional treatment.

Alcohol may be **administered** in the form of brandy, whisky, or champagne. It is one of the most valuable solvents and preservatives known, and, in appropriate strength, is the menstruum employed in the manufacture of various tinctures, spirits and other galenical preparations. It is also widely used in perfumery and in the manufacture of culinary essences. Diluted alcohol may be used **externally** as an evaporating lotion in various forms of skin inflammation, to diminish sweating, to prevent bed sores, and, in surgery, to sterilise the skin of the patient and the hands of the operator. As, however, industrial methylated spirit and suitable preparations of it are obtainable for these purposes, the use of rectified spirit is not essential. Alcohol hardens by dehydrating, and may therefore be applied to the nipples before lactation. Its greatest bactericidal effect is obtained from a solution containing 70 per cent. of ethyl alcohol.

SPIRITUS FRUMENTI.—Whisky is an alcoholic liquid obtained by distillation from a fermented mash of malted cereal grains, and usually contains about 40 per cent. v/v of C_2H_5OH. It occurs as an amber-coloured liquid, with a distinctive odour and taste, and a slightly acid reaction. It usually contains about 0·1 to 0·2 per cent. of higher alcohols, about 0·03 to 0·08 per cent. of esters, about 0·2 to 0·8 per cent. of volatile acid, about 0·001 to 0·003 per cent. of furfural, and about 0·015 to 0·04 per cent. of other aldehydes, to which secondary products the flavour and odour are due.

SPIRITUS VINI GALLICI.—Brandy is obtained by distillation from the wine of grapes, and matured by age. It occurs as a pale, amber-coloured liquid, having a characteristic odour and taste, and, as a rule, a slightly acid reaction. It contains about 40 per cent. v/v of C_2H_5OH. It usually contains about 0·05 to 0·15 per cent. of higher alcohols, about 0·1 to 0·15 per cent. of esters, about 0·05 to 0·2 per cent. of volatile acid, about 0·0005 to 0·002 per cent. of furfural and about 0·02 to 0·04 per cent. of other aldehydes.

The action of brandy and whisky is due mainly to their content of ethyl alcohol. Although the presence of higher alcohols, volatile oils, aldehydes and esters may not be without therapeutic effect, it is not possible in the present state of knowledge to define their pharmacological action. Brandy has the reputation of being of value in the milder forms of diarrhœa and vomiting. As a restorative in syncope it should be given neat, and acts by reflex stimulation of the medulla. In the treatment of acute infections, *e.g.* pneumonia, brandy, 1 ounce, four-hourly for an adult or in smaller doses for children, is of value. By the depressant action on the central nervous system it allays the painful inhibitions to respiration caused by the accompanying pleurisy and so allows of quieter and deeper breathing. Furthermore, and this is of utmost importance in promoting recovery in an acute infection, brandy engenders calm and peaceful sleep. Brandy and whisky are often of benefit in the early stages of a "chill." They act by dilatation of the vessels of the mucous membranes, and the local resistance of the tissue to infection is thereby increased; they should be administered with an equal quantity of water after the patient has retired to bed. The simultaneous administration of a dose of powder of ipecacuanha and opium and acetylsalicylic acid may with advantage be prescribed. Brandy is probably a better hypnotic than whisky; it should be given immediately before retiring. CHAMPAGNE is often of value in checking the toxic vomiting of pregnancy and in sea-sickness, the carbon dioxide acting as a gastric sedative and the alcohol as a food. Champagne is often tolerated better than brandy or whisky in the acute febrile states when toxic gastritis is present. It tends to shorten convalescence in such conditions as post-influenzal debility.

Preparations

Alcohol Ammoniatum, B.P.C.— Alcoh. Ammon.)—Ammoniated Alcohol. An alcoholic solution of ammonia, containing from 9 per cent. to 11 per cent. w/w of NH_3.

Lotio Evaporans, B.P.C.—(Lo. Evap.)—Evaporating Lotion. Alcohol, 1 in 8, with ammonium chloride and distilled water.

Mistura Spiritus Vini Gallici, B.P.C.—(Mist. Sp. Vin. Gall.)—Mixture of Brandy. Two fluid ounces contains about 6 fluid drachms of brandy, with yolk of egg, sucrose and cinnamon water. Dose.– (as a draught) 30 to 60 millilitres (1 to 2 fluid ounces).

ALCOHOL AMYLICUM

(Alcoh. Amyl.)

Amyl Alcohol

$C_5H_{12}O = 88{\cdot}09$

Synonym—Amylic Alcohol.

Amyl alcohol is a mixture of approximately 10 per cent. of primary active amyl alcohol (methyl-2-butanol-1) and 90 per cent. of primary *iso*amyl alcohol (methyl-3-butanol-1) obtained by purifying fusel oil. It occurs as a colourless liquid having a characteristic odour. The flash-point is 19·5°.

Slightly **soluble** in water; miscible in all proportions with alcohol, ether, chloroform, carbon disulphide, light petroleum, benzene, and fixed and volatile oils.

Standard.—Amyl alcohol boils between 128° and 132°. Specific gravity, 0·815 to 0·817. Residue on evaporation, not more than 0·01 per cent. Acidity, calculated as acetic acid, not more than 0·01 per cent. When mixed with an equal volume of sulphuric acid a clear and almost colourless solution is produced.

Action and Uses.—Amyl alcohol has an action very similar to that of ethyl alcohol, but is a more pronounced local irritant. In chronic alcohol poisoning, the deleterious effects are attributed more to amyl alcohol than to ethyl alcohol, but this is not based on satisfactory evidence; the importance of amyl alcohol depends on the fact that small quantities are present in most forms of spirit, especially when these are "raw" or freshly distilled. Amyl alcohol is used chiefly as a solvent.

ALCOHOL DEHYDRATUM

(Alcoh. Dehyd.)

Dehydrated Alcohol

$C_2H_6O = 46{\cdot}05$

Synonyms—Alcohol Absolutum; Absolute Alcohol.

Dehydrated alcohol, $CH_3{\cdot}CH_2OH$, may be obtained by the

dehydration of weaker spirit and subsequent distillation. It possesses the characters of alcohol (95 per cent.), but is very hygroscopic.

Standard, B.P.—Dehydrated alcohol contains not less than 99·4 per cent. v/v or 99 per cent. w/w of C_2H_6O. Specific gravity, 0·7936 to 0·7967. Refractive index at 20°, 1·3614 to 1·3618. It complies with a limit test for water and with the tests for purity for Alcohol.

Action and Uses.—Dehydrated alcohol is used in the preparation of Liquor Æthylis Nitritis and of Liquor Sodii Æthylatis. It is a valuable solvent and dehydrating agent, especially in microscopical technique. It is used in aseptic containers to store surgical needles, sutures, etc., in sterile condition, ready for use. Dehydrated alcohol for **injection** should be filled into sterile containers under aseptic conditions.

Preparation

Liquor Sodii Æthylatis, B.P.C.—(Liq. Sod. Æthylat.)—Solution of Sodium Ethylate. A solution of sodium in dehydrated alcohol, 1 in 20.

ALCOHOL ISOPROPYLICUM

(Alcoh. Isopropyl.)

Isopropyl Alcohol

$C_3H_8O = 60·06$

Isopropyl alcohol, $(CH_3)_2CH·OH$, may be obtained by the reduction of acetone or, as a by-product in the petroleum industry, by absorbing olefine gases containing propylene in sulphuric acid, and hydrolysing the resulting sulphuric acid esters. It is a colourless liquid, with a characteristic alcoholic odour. When heated just to boiling with mercuric sulphate solution, a white or yellow precipitate is formed, and this reaction may be used to distinguish it from methyl and ethyl alcohols. Heated with half its volume of sulphuric acid, propylene is evolved and is readily detected by its characteristic odour. When heated with four volumes of a 10 per cent. potassium dichromate solution and one volume of sulphuric acid, acetone is evolved. Anhydrous isopropyl alcohol has a specific gravity of 0·788 and boils at 82·4°. Isopropyl alcohol, containing water in varying degrees, is also obtainable having specific gravities from 0·793 to 0·795. Technical varieties may contain more than traces of aldehydes and ketones and possess a disagreeable odour and bitter taste.

Miscible with water, but salted out by means of salts or sodium hydroxide.

Standard.—Isopropyl alcohol contains about 96 per cent. v/v, corresponding to about 94 per cent. w/w, of C_3H_8O. Boiling-point,

from 80·5° to 81·5°. Specific gravity, 0·810 to 0·812. Residue on evaporation and drying at 100°, not more than 0·01 per cent. To 10 millilitres, diluted with 20 millilitres of water, add 0·5 millilitre of decolourised magenta solution containing 0·1 per cent. of pyrogallol and mix well; no pink colouration is produced within one minute (limit of aldehydes). To 5 millilitres add 2 millilitres of N/1 sodium hydroxide and 5 drops of sodium nitroprusside solution; on slightly acidifying with acetic acid, no violet colour is produced within one minute (limit of ketones).

Action and Uses.—Isopropyl alcohol is twice as toxic as ethyl alcohol when given intravenously to cats, but it is sufficiently non-toxic for external and oral administration in small amounts. Inhalation of its vapour has not been found to cause the defects in vision associated with methyl alcohol. Isopropyl alcohol is not potable and its ingestion produces a form of intoxication which resembles that produced by ethyl alcohol. In concentrations up to 50 per cent., applied externally to open wounds, it allows healing to take place normally. It has been used for skin sterilisation, also in antiseptic solutions for the throat Isopropyl alcohol may be used for drying nitrocellulose, sugars, starches, animal or vegetable tissues, and for dehydrating histological specimens. It is used in cosmetics and the cheaper varieties of perfume and culinary essences.

ALCOHOL BUTYLICUM.—*n*-Butyl alcohol or butanol, $CH_3(CH_2)_3OH$, may be prepared by fermentation processes from maize flour, or synthetically from acetaldehyde, or by the catalytic hydrogenation of water-gas or coal-gas. It occurs as a colourless liquid, having a specific gravity of about 0·814 to 0·816 and a boiling-range of 113° to 119°. It is used in the manufacture of butyl acetate and as a solvent in the varnish and lacquer industries.

ALCOHOL METHYLICUM

(Alcoh. Methyl.)

Methyl Alcohol

$CH_4O = 32·03$

Synonyms—Methanol; Methyl Alcohol (acetone-free).

Methyl alcohol, $CH_3{\cdot}OH$, may be obtained by the destructive distillation of wood or by the catalytic hydrogenation of water-gas and subsequent purification of the product. It occurs as a colourless liquid with an alcoholic odour, and is also known in commerce as Alcohol Methyl Puriss. (acetone-free). When treated with oxidising agents, such as acid solution of potassium permanganate, it yields formaldehyde and formic acid, and this reaction forms the basis of the usual test for methyl alcohol in ethyl alcohol.

Commercial wood spirit, wood naphtha, or pyroxylic spirit, is a clear, yellowish, inflammable liquid consisting of methyl alcohol (60 to 90 per cent.), together with acetone, aldehyde, water and other substances.

Wood spirit for use in denaturing alcohol is required to contain not less than 72 per cent. v/v of methyl alcohol, not more than 12 grammes per 100 millilitres of acetone, aldehyde and higher ketones, estimated as acetone, and not more than 3 grammes per 100 millilitres of esters, calculated as methyl acetate; it must also comply with certain limits for unsaturated compounds and acidity.

Miscible with water and organic solvents.

Standard.—Methyl alcohol has a specific gravity not higher than 0·799. Residue on evaporation, not more than 0·05 per cent. To 5 millilitres add 50 millilitres of sodium hydroxide solution (1 in 10) and 25 millilitres of N/10 iodine and shake repeatedly; no turbidity or precipitate appears, and when heated at 60° to 70° for thirty minutes, no odour of iodoform develops (limit of ethyl alcohol). To 5 millilitres add 2 millilitres of N/1 sodium hydroxide and 0·2 millilitre of a 2 per cent. aqueous solution of sodium nitroprusside; on slightly acidifying with acetic acid, no violet colouration is produced within one minute (limit of acetone). The colour of a mixture of 50 millilitres of the alcohol and 2 millilitres of a 0·02 per cent. solution of potassium permanganate maintained at 15° to 16° is not discharged within ten minutes (limit of readily oxidisable substances). On shaking in the cold with an equal volume of sulphuric acid, not more than a faint yellow colouration is produced (limit of empyreumatic substances).

Action and Uses.—Methyl alcohol is more slowly oxidised in the body than ethyl alcohol so that its effects last longer; the oxidation is also incomplete, formic acid and formaldehyde being formed. It is never given internally; one fluid drachm has caused permanent blindness and one fluid ounce has proved fatal. It has been used in so-called "hygienic" lamps designed for slow combustion by means of a cone of platinum black, formaldehyde being produced. It is largely employed as a solvent in the arts and sciences. Methyl alcohol is used as a solvent in the preparation of Leishman's stain for blood, preparatory to microscopical examination. In cases of **poisoning** by methyl alcohol the stomach should be evacuated by the stomach pump or by apomorphine given hypodermically. This should be followed by gastric lavage with sodium bicarbonate solution, and the administration of strong coffee, brandy, or strychnine.

ALETRIS
(Aletr.)

Aletris

Synonyms—Ague Root; Colic Root; Star Grass; Unicorn Root.

Aletris consists of the dried rhizome and roots of *Aletris farinosa* Linn. (Fam. Liliaceæ), a small perennial herb growing throughout the Eastern United States of America. It is collected after the plant has flowered.

The rhizome is short, horizontal, nearly cylindrical, from 1 to 6 centimetres in length and from 3 to 9 millimetres in thickness. The upper surface shows circular stem-scars and is covered with the papery fibrous bases of radical leaves, the upper parts of which have been cut away. The under surface bears numerous short, tough, wiry rootlets, some of which are devoid of the outer layers, or scars where rootlets have been broken off. The rhizome is brown externally and yellowish-white internally; the fracture is short and starchy in the cortex, uneven and lacunous in the centre. The odour is slight and resembles that of acetic acid; the taste at first is sweetish and afterwards soapy and bitter.

The diagnostic **microscopical** characters are the numerous small glandular trichomes, consisting of a unicellular stalk and a sub-spherical head; the cells of the cortex filled with starch grains, mostly simple, spherical or ellipsoidal, and from 3 to 15 microns (mostly 6 microns) in diameter; the occasional cortical cells filled with acicular raphides of calcium oxalate about 15 to 50 microns in length; the lacunar stele traversed in various directions by numerous concentric, vascular bundles having phloem in the centre and surrounded by rather thin-walled, lignified and pitted parenchyma.

No definite **constituents** have been isolated. It yields to alcohol (45 per cent.) from 9 to 15 per cent. of extractive.

Standard.—Aletris contains not more than 5 per cent. of foreign organic matter. Acid-insoluble ash, not more than 10 per cent.

Action and Uses.—Aletris is used in the form of elixir and liquid extract as a so-called "uterine tonic."

Preparations

Elixir Aletridis, B.P.C.—(Elix. Aletr.)—Elixir of Aletris. Liquid extract of aletris, 1 in 4, with liquid extract of liquorice, simple elixir and distilled water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm)

Extractum Aletridis Liquidum, B.P.C.—(Ext. Aletr. Liq.)—Liquid Extract of Aletris. 1 in 1. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

ALLANTOINUM

(Allant.)

Allantoin

$C_4H_6O_3N_4 = 158{\cdot}1$

Allantoin is a diureide of glyoxylic acid. It is present in the allantois, in comfrey root, and in the young shoots of the plane and maple, and may be prepared by the oxidation of uric acid with alkaline potassium permanganate solution. It occurs in colourless, glistening prisms, melting at about 235°. Oxidising agents convert it into allanturic acid, $C_3H_4O_2N_2$. The solution in sodium hydroxide evolves ammonia when heated, with simultaneous production of urea.

Soluble in water (1 in 130) and alcohol.

Action and Uses.—Allantoin has been used as a cell proliferant. Experiments on plants seem to show that it exerts a perceptibly stimulating action on growth. It may replace the decoction of comfrey root in the treatment of gastric ulcer. Proof as to its value in clinical medicine is still lacking. Allantoin has no antiseptic properties; it has been applied locally to sluggish wounds, sores, and abscesses to promote the formation of epithelial tissue.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

ALLIUM
(Allium)
Garlic

Garlic is the fresh compound bulb of *Allium sativum* Linn. (Fam. Liliaceæ). It is a native of Southern Europe, but is widely cultivated. Garlic may be kept in good condition for about six months after harvesting if **stored** in a cool, dry place and exposed to the air.

The compound bulb is subglobular, greyish-white, 4 to 6 centimetres in diameter, and consists of from 8 to 20 cloves, the whole of which are surrounded by from 3 to 5 whitish, papery, membranous scales, formed from the leaf-bases of the previous year's bulb and terminating in a thick, papery outgrowth. The cloves are attached to a flattened, circular, woody axis from which numerous thin, wiry roots arise on the under side and which bears upon the upper surface short, sub-cylindrical outgrowths, each of which forms the axis of a clove. Each clove is ovoid, appearing from 3- to 4-sided when cut transversely; the cut surface shows that each is surrounded by two papery scale leaves, the outer one whitish and loose, the inner one pink and adherent, but easily separable from the solid portion of the clove. These enclose two whitish, fleshy scales, the inner one thinner and smaller than the outer. In the centre are one or two yellowish-green, conduplicate foliage leaves. Garlic has a slight alliaceous odour, which becomes very strong and disagreeable when the drug is bruised; the taste is strongly pungent, alliaceous and persistent.

Garlic **contains** about 0·1 to 0·3 per cent. of an optically inactive volatile oil of specific gravity 1·045 to 1·060, containing allylpropyl disulphide and diallyl disulphide. It also contains a glycoside, alliin, which is hydrolysed by an enzyme, allisin, with formation of lævulose and the volatile oil. Garlic yields, when strongly pressed, about one-fourth of its weight of a viscous juice.

Action and Uses.—Garlic has antiseptic, diaphoretic, diuretic and expectorant properties. Large doses, continued, are stated to cause an increase in blood pressure. The juice has been used in laryngeal tuberculosis, and poultices made from pulped garlic are stated to be

useful in accessible tuberculous lesions. The juice, diluted with four parts of water, has been used **externally** for treating suppurating wounds, and by inhalation for pulmonary tuberculosis. The fresh juice is extremely irritating when applied to broken surfaces. Garlic is **administered** as juice, syrup, or volatile oil, also in the form of infusion which is sometimes taken in milk. Cases have been reported where its use internally has proved fatal to children.

Dose.– 2 to 8 grammes (½ to 2 drachms), of the fresh bulb.

Preparations

Succus Allii, B.P.C.—(Succ. Allii)—Juice of Garlic. The juice expressed from fresh garlic, mixed with alcohol (90 per cent.) and distilled water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Syrupus Allii, B.P.C.—(Syr. Allii)—Syrup of Garlic. Juice of garlic, about 18 per cent. v/v, with sucrose, dilute acetic acid and distilled water. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

ALLOBARBITONUM

(Allobarbiton.)

Allobarbitone

$C_{10}H_{12}O_3N_2 = 208{\cdot}1$

Synonyms—Diallylbarbituric Acid; Diallylmalonylurea.

Allobarbitone is 5 : 5-diallylbarbituric acid and may be prepared by the condensation of the ethyl ester of diallylmalonic acid with urea. It occurs as a white, crystalline powder which is odourless and has a slightly bitter taste. The saturated aqueous solution is acid to litmus. When fused with caustic alkali, or when boiled with a strong solution, it gives off ammonia. When 0·1 gramme is dissolved in 1 millilitre of sulphuric acid, the solution is yellow, the colour changing slowly to a dark red. A saturated solution in water decolourises bromine water and potassium permanganate when either reagent is added drop by drop.

Slightly **soluble** in water; soluble in alcohol and ether; readily soluble in solutions of alkali hydroxides and carbonates.

Standard.—Allobarbitone melts between 171° and 172°. Ash, not more than 0·1 per cent.

Action and Uses.—Allobarbitone is a reasonably safe and reliable hypnotic. Its hypnotic action is similar to that of barbitone in that its administration is followed by quietness and sleep, but it is more readily absorbed. Idiosyncrasy to allobarbitone may be shown, a skin rash with fever being one of the common manifestations. Overdosage, often the result of cumulative action, may produce coma, with the attendant liability to respiratory complications. Allobarbitone is **administered** in tablets or cachets swallowed with a draught of hot liquid, and is sometimes given by subcutaneous injection. In cases of **poisoning**

by allobarbitone, the procedure described under Barbitonum should be followed.

Dose.– 0·03 to 0·18 gramme (½ to 3 grains).

ALLYLIS SULPHIDUM
(Allyl. Sulphid.)

Allyl Sulphide

$C_6H_{10}S = 114·1$

Allyl sulphide, $(C_3H_5)_2S$, may be prepared by heating allyl iodide with potassium sulphide in alcoholic solution. It is a colourless or pale yellow oil, with an unpleasant odour resembling that of garlic. It yields a crystalline precipitate with alcoholic solution of mercuric chloride or of platinic chloride. Allyl sulphide boils at about 138°, and has a specific gravity of 0·890 to 0·900.

Slightly **soluble** in water; soluble in alcohol and ether.

Action and Uses.—Allyl sulphide, when injected intravenously in large doses, acts chiefly on the respiratory centre in the medulla, paralysing it rapidly; it acts to a lesser degree on the vasomotor centre. When given orally it is excreted by the lungs and skin. One half-minim of allyl sulphide per kilogramme of body-weight may be taken as being the lethal dose; death results from asphyxia owing to paralysis of the respiratory centre. Allyl sulphide is regarded as a powerful germicide, and is used chiefly in the treatment of tuberculosis; for this purpose it is **administered**, diluted with oil, in capsules, or inhaled from an oro-nasal inhaler. Its use rapidly diminishes cough and expectoration. Allyl sulphide is also administered in chronic bronchitis and bronchiectasis; it was formerly recommended for use in cholera. It should not be given undiluted on account of its irritant properties. Local applications have been used in lupus and tuberculous abscesses; a subcutaneous injection of a solution in oil has also been recommended. In cases of **poisoning** by allyl sulphide, artificial respiration should be used.

Dose.– 0·03 to 0·12 millilitre (½ to 2 minims).

ALOE
(Aloe)

Aloes

Aloes is the solid residue obtained by evaporating the liquid which drains from the leaves cut from various species of *Aloe* (Fam. Liliaceæ). The juice is concentrated by spontaneous evaporation or, more

generally, by boiling, until it solidifies on cooling; it is then poured into boxes or other suitable receptacles. Slow and moderate concentration of the juice tends to induce crystallisation of the aloin, thus causing the drug to appear opaque; such aloes is termed "livery" or "hepatic" and splinters of it exhibit minute crystals of aloin when examined under the microscope. If, on the other hand, the evaporation is carried out rapidly and taken as far as possible, the aloin does not crystallise and small fragments of the drug appear transparent; it is then termed "glassy," "vitreous," or "lucid" and does not exhibit crystals of aloin under the microscope.

Cape aloes occurs in dark brown or greenish-brown, glassy masses, thin fragments of which are transparent and exhibit a yellowish, reddish-brown, or greenish tinge; it breaks with a clean, glassy fracture and has a distinctive, somewhat acid odour. Curaçao aloes has a dark, chocolate-brown colour and occurs usually in opaque masses, which break with a dull, waxy, uniform and frequently conchoidal fracture; it has a characteristic penetrating odour; occasional specimens are vitreous. Socotrine aloes occurs in hard, dark brown or nearly black, opaque masses, with an uneven, porous fracture, and an unpleasant, cheesy odour. Zanzibar aloes is livery-brown and has a nearly smooth, slightly porous fracture; its odour is slight and not disagreeable. Aloes has a nauseous, bitter taste. The following chemical tests may be used to identify aloes and its varieties. Prepare a 1 per cent. w/v solution by boiling aloes with water until nearly dissolved, adding diatomite and filtering until clear. Add 0·2 gramme of borax to 5 millilitres of the filtrate and dissolve by boiling; a few drops of the resulting solution give a green fluorescence when added to water. Another portion of the filtered aqueous solution gives a copious, pale yellow precipitate when mixed with an equal volume of freshly prepared bromine solution. Mix 5 millilitres of the filtrate with 2 millilitres of nitric acid; that prepared from Cape aloes gives a yellowish-brown colour, passing rapidly to a vivid green; with Curaçao aloes, the colour is a deep brownish-red; with Socotrine aloes, a pale brownish-yellow; and with Zanzibar aloes, a yellowish-brown. The Cape and Curaçao varieties are almost entirely **soluble** in alcohol (60 per cent.).

Aloes **contains** the pale yellow, crystalline glycoside, barbaloin. In Curaçao aloes this is accompanied by *iso*barbaloin, but little or none of the latter is found in the other varieties. There is also present an amorphous β-barbaloin which can be produced by heating barbaloin for about three hours at 160° to 165°; these substances are water-soluble. Other constituents are resin, aloe-emodin and water-soluble substances of which nothing definite is known; aloe-emodin is a hydrolytic product of barbaloin. The resin of Cape aloes and probably of Zanzibar and of Socotrine aloes consists of capaloresinotannol combined with *p*-cumaric acid; the resin of Curaçao aloes contains also barbaloresinotannol combined with cinnamic acid. Cape aloes may yield up to nearly 10 per cent. of crystallisable aloins; good Curaçao aloes may yield up to 30 per cent.; Socotrine and Zanzibar aloes yield rather less.

Varieties.—Four varieties of aloes are official in the British Pharmacopœia; these are known in commerce as Cape, Curaçao, Socotrine and Zanzibar aloes. Cape aloes is prepared in Cape Colony from *Aloe ferox* Miller. Curaçao aloes is obtained from *A. vera* Linn. var. *officinalis* (Forsk.) Baker on the Dutch Islands of Curaçao, Aruba and Bonaire; it was formerly produced on the island of Barbados and is still frequently, but improperly, called Barbados aloes. Socotrine aloes is prepared to a certain extent on the island of Socotra, but probably more largely on the African and possibly also on the Arabian mainland, from the leaves of *Aloe Perryi* Baker; it is imported usually in kegs in a pasty condition and subsequent drying is necessary. Zanzibar aloes, which is generally regarded as a variety of Socotrine, is usually imported in skins or in masses covered with leaves.

Substitutes.—Other kinds of aloes are known in commerce. Natal aloes, believed to be derived from *A. candelabrum* Berger, is rarely imported; it resembles Cape aloes in odour, but is opaque, and when the powder is mixed with sulphuric acid and the vapour of nitric acid blown over it, a deep blue colouration is produced. "Mocha" aloes is occasionally imported from Bombay; it is a black, brittle, glossy aloes with a strong odour, and is of inferior quality. Jaffarabad aloes is also nearly black, but does not enter English commerce.

Standard, B.P.—Aloes loses, when dried at 100°, not more than 10 per cent. of its weight. Ash, not more than 5 per cent.

Aloes, in powder (Pulvis Aloes : Pulv. Aloes), contains the constituents and possesses the properties of Aloe, and complies with the standard for the unground drug.

Action and Uses.—Aloes is used as a cathartic. A dose of from 2 to 3 grains takes from eight to twelve hours to produce an effect; this may be due to the fact that aloin is slowly converted, in the bowel, into an amorphous body which induces the local irritation; its action is therefore delayed, and is exerted on the large intestine. It is one of the most valuable drugs in the treatment of constipation. The pronounced action of aloes on the large intestine induces some pelvic congestion, and it is, therefore, employed as an emmenagogue in amenorrhœa, generally with iron. Aloes should not be used when there is intestinal irritation or catarrh. Its use is contra-indicated for pregnant or nursing women. Preparations of aloes are rarely prescribed alone; they require the addition of carminatives to moderate the tendency to griping. The compound preparations of aloes in use generally contain such correctives. Aloes in one form or another is a common domestic medicine, and is the basis of many proprietary pills.

Dose.—0·12 to 0·3 gramme (2 to 5 grains).

Preparations

Decoctum Aloes Compositum, B.P.C.—(Dec. Aloes Co.)—Compound Decoction of Aloes. Aloes, 1 per cent. w/v, with myrrh, potassium carbonate, extract of liquorice, compound tincture of cardamom and distilled water. When Decoctum Aloes Compositum is prescribed, either this preparation, or Decoctum Aloes Compositum Concentratum diluted with three times its volume of distilled water, may be dispensed. Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

This decoction, prepared with extract of aloes instead of aloes, was included in the British Pharmacopœia, 1914.

Decoctum Aloes Compositum Concentratum, B.P.C.—(Dec. Aloes Co. Conc.)—Concentrated Compound Decoction of Aloes. A product closely resembling compound decoction of aloes is obtained by diluting one part of this preparation with three parts of distilled water. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Aloes, B.P.C.—(Ext. Aloes)—Extract of Aloes. A dry aqueous extract. Dose.– 0·06 to 0·25 gramme (1 to 4 grains).

Pilula Aloes, B.P.—(Pil. Aloes)—Pill of Aloes. Aloes, about 58 per cent., with hard soap, oil of caraway and syrup of liquid glucose. Dose.– 0·25 to 0·5 gramme (4 to 8 grains).

Pilula Aloes et Asafœtidæ, B.P.—(Pil. Aloes et Asafœt.)—Pill of Aloes and Asafetida. Aloes and asafetida, of each about 30 per cent., with hard soap and syrup of liquid glucose. Dose.– 0·25 to 0·5 gramme (4 to 8 grains).

Pilula Aloes et Ferri, B.P.—(Pil. Aloes et Ferr.)—Pill of Aloes and Iron. Exsiccated ferrous sulphate, about 10 per cent., and aloes about 20 per cent., with cinnamon, cardamom, ginger and syrup of liquid glucose. 0·5 gramme contains about 0·05 gramme of exsiccated ferrous sulphate corresponding to about 0·015 gramme of iron; 8 grains contains about $\frac{4}{5}$ grain of exsiccated ferrous sulphate corresponding to about $\frac{1}{4}$ grain of iron. Dose.– 0·25 to 0·5 gramme (4 to 8 grains).

Pilulæ Aloes et Myrrhæ, B.P.C.—(Pil. Aloes et Myrrh.)—Aloes and Myrrh Pills. *Syn.*—Pilulæ Rufi; Rufus Pills. Each pill contains 2 grains of aloes and 1 grain of myrrh. Dose.– 1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914.

Pilulæ Aloes et Nucis Vomicæ, B.P.C.—(Pil. Aloes et Nuc. Vom.)—Aloes and Nux Vomica Pills. Each pill contains 2 grains of aloes, $\frac{1}{4}$ grain of dry extract of nux vomica and $\frac{1}{6}$ grain of dry extract of belladonna. Dose.– 1 pill.

Pilulæ Colchici et Aloes, B.P.C.—(Pil. Colch. et Aloes)—Colchicum and Aloes Pills. Each pill contains $\frac{1}{4}$ grain each of dry extract of colchicum, dry extract of hyoscyamus and aloes. Dose.– 1 to 4 pills.

Pulvis Aloes et Canellæ, B.P.C.—(Pulv. Aloes et Canell.)—Aloes and Canella Powder. *Syn.*—Hiera Picra. Aloes, 4 parts; canella, 1 part. Dose – 0·2 to 0·6 gramme (3 to 10 grains).

Tinctura Aloes, B.P.C.—(Tinct Aloes)—Tincture of Aloes. Aloes, 1 in 40, and liquid extract of liquorice, about 1 in 6. Dose.– 2 to 8 millilitres ($\frac{1}{2}$ to 2 fluid drachms).

Tinctura Aloes Composita, B.P.C.—(Tinct. Aloes Co.)—Compound Tincture of Aloes. Aloes, about 1 in 30, and gentian, rhubarb and ginger, of each 1 in 200. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Tinctura Aloes et Myrrhæ, B.P.C.—(Tinct. Aloes et Myrrh.)—Tincture of Aloes and Myrrh. *Syn.*—Elixir Proprietatis. Aloes, 1 in 10, and saffron, in tincture of myrrh. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Tinctura Antiperiodica, B.P.C.—(Tinct. Antiperiod.)—Antiperiodic Tincture. *Syn.*—Warburg's Tincture. Aloes, about 1 in 40, quinine sulphate, 1 in 50, with rhubarb, angelica fruit, elecampane, saffron, fennel, chalk, gentian, zedoary, cubeb, myrrh, agaric, opium, black pepper, cinnamon, ginger and camphor. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Vinum Aloes, B.P.C.—(Vin. Aloes)—Aloes Wine. Aloes, about 1 in 30, cardamom and ginger, macerated in sherry-type wine. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

ALOINUM
(Aloin.)
Aloin

Aloin is a mixture of crystalline principles obtained from aloes; it is obtained chiefly from Curaçao aloes, but may be obtained also from other varieties. It may be extracted from aloes by means of boiling acidified water, the filtered solution being evaporated and allowed to crystallise. When obtained from Curaçao aloes it consists of the crystalline substances barbaloin and *iso*barbaloin in approximately equal proportions. Barbaloin, $C_{21}H_{20}O_9$, is a methylanthraquinone derivative of glycosidal character yielding aloe-emodin (trihydroxymethylanthraquinone) and *d*-arabinose on hydrolysis; it is converted into amorphous β-barbaloin by heating at 160° to 165° for about three hours. *iso*Barbaloin is distinguished by yielding the cupraloin reaction. Aloin obtained from Socotrine or Zanzibar aloes consists chiefly of barbaloin, but also contains β-barbaloin; *iso*barbaloin is absent.

Aloin occurs as a pale yellow, microcrystalline powder which is odourless, or has a faint odour of aloes, and has an intensely bitter taste. It is stable in neutral or acid solutions but not in alkaline solutions. It dissolves readily in ammonium hydroxide solution, giving a liquid which is red, or yellow changing to red, and has a greenish-red fluorescence.

Almost entirely **soluble** in water (about 1 in 130), alcohol and acetone; almost insoluble in ether, chloroform and benzene. The proportion of matter insoluble in water varies greatly with the temperature of the water, and samples giving less than 1·5 per cent. at 25° may yield as much as from 7 to 10 per cent. at 15°.

Standard, B.P.—Aloin yields, on ignition, not more than 0·5 per cent. of residue and contains not more than 1·5 per cent. of matter insoluble in water. The saturated aqueous solution is neutral or only faintly acid to litmus.

Action and Uses.—The action of aloin is the same as that of aloes, although it has the disadvantage of being more easily absorbed. It has sometimes produced signs of renal irritation during excretion in the urine. It is **administered** in the form of pills, tablets, or cachets, often with phenolphthalein, and is frequently combined with extract of nux vomica or strychnine, ferrous sulphate, myrrh, ipecacuanha and extract of belladonna.

Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

Preparations

Pilulæ Aloini Compositæ, B.P.C.—(Pil. Aloin. Co.)—Compound Aloin Pills. *Syn.*—Andrew Clark's Liver Pills. Each pill contains ½ grain each of aloin, dry extract of nux vomica, exsiccated ferrous sulphate, myrrh and hard soap, Dose.– 1 pill.

Pilulæ Aloini et Podophyllini Compositæ, B.P.C.—(Pil. Aloin. et Podoph. Co.)—Compound Aloin and Podophyllin Pills. Each pill contains $\frac{1}{10}$ grain each of aloin and jalap resin, $\frac{1}{100}$ grain of oleoresin of capsicum, $\frac{1}{20}$ grain each of the dry extracts of nux vomica and hyoscyamus, and about $\frac{1}{8}$ grain of resin of podophyllum. Dose.– 1 to 4 pills.

Pilulæ Aloini et Strychninæ Compositæ, B.P.C.—(Pil. Aloin. et Strych. Co.)—Compound Aloin and Strychnine Pills. Each pill contains $\frac{1}{4}$ grain of aloin, $\frac{1}{60}$ grain of strychnine, $\frac{1}{10}$ grain of dry extract of belladonna and $\frac{1}{20}$ grain of powdered ipecacuanha. Dose.—1 or 2 pills.

Pilulæ Ferri Carbonatis Compositæ, B.P.C.—(Pil. Ferr. Carb. Co.)—Compound Iron Carbonate Pills. *Syn.*—Blaud's Pill with Aloin and Cascara. Each pill contains $\frac{1}{10}$ grain of aloin, $\frac{1}{2}$ grain of dry extract of cascara sagrada and 5 grains of pill of iron carbonate. Dose.– 1 to 3 pills.

Pilulæ Phenolphthaleini Compositæ, B.P.C.—(Pil. Phenolphthal. Co.)—Compound Phenolphthalein Pills. *Syn.*—Pilulæ Phenaloini. Each pill contains $\frac{1}{4}$ grain of aloin, $\frac{1}{2}$ grain of phenolphthalein, $\frac{1}{60}$ grain of strychnine, $1\frac{1}{2}$ grain of dry extract of belladonna and $1\frac{1}{2}$ grain of powdered ipecacuanha. Dose.– 1 or 2 pills.

Tabellæ Aloini Compositæ, B.P.C.—(Tab. Aloin. Co.)—Compound Aloin Tablets. Each tablet contains $\frac{1}{4}$ grain of aloin, $\frac{1}{4}$ grain of powdered ipecacuanha and $\frac{1}{8}$ grain of dry extract of nux vomica. Dose.– 1 or 2 tablets.

Tabellæ Ferri Carbonatis et Aloini, B.P.C.—(Tab. Ferr. Carb. et Aloin.)—Tablets of Iron Carbonate and Aloin. *Syn.*—Blaud's Tablets with Aloin. Each tablet is approximately equivalent to 5 grains of pill of iron carbonate and contains also $\frac{1}{20}$ grain of aloin. Dose.– 1 to 6 tablets.

ALSTONIA

(Alston.)

Alstonia

Synonyms—Australian Fever Bark; Alstoniæ Cortex; Dita Bark.

Alstonia is the dried bark of *Alstonia scholaris* R. Br. (Fam. Apocynaceæ), a tree growing in India, Burma and the Philippine Islands, known as dita bark, and of *A. constricta* F. Muell., which grows in Australia, known as Australian fever bark.

The bark of *A. scholaris* occurs in channelled or, occasionally, quilled pieces, up to about 3 to 4 millimetres thick, from the branches, and cut or broken, irregular, curved or flat pieces, up to about 7 millimetres thick, from the stem. Externally, the younger bark is dark grey to brownish and the older bark is very rough, uneven and much fissured, both transversely and longitudinally; both are marked by numerous rounded or transversely elongated, grey to whitish-brown lenticels. Internally, it is brownish-buff to dark greyish-brown, somewhat striated and indented. The fracture is short and the smoothed transverse surface shows a narrow, inner portion traversed by numerous, fine, medullary rays and a spongy outer portion of varying extent. It is odourless, and the taste persistently bitter. The bark of *A. constricta* occurs in quills and curved pieces, often of considerable size. The

outer surface is brown or yellowish-brown, strongly rugose, with large, deeply fissured reticulations; internally, it is cinnamon-brown and coarsely striated. The transverse section exhibits an abundant dark brown periderm, within which is a yellowish-brown layer, the secondary phloem, which contains abundant fibres in tangentially arranged groups. The fracture is short and granular in the outer layers and fibrous in the inner. Alstonia has a very bitter taste and yields a yellowish infusion having a well-marked blue fluorescence.

The bark of *A. scholaris* **contains** the alkaloids, ditamine, echitenine, echitamidene and echitamine. Echitamine (ditaine), $C_{22}H_{28}O_4N_2,H_2O$, the most important of these alkaloids, forms crystalline salts and has also been obtained from a Java species, *A. spectabilis* R. Br., and two West African plants, *A. congensis* Engl. and *A. Gilletii* De Wild. Echitamidene, $C_{20}H_{26}O_3N_2,H_2O$, melting-point, 135°, is crystalline and also occurs in *A. congensis*. Ditamine, $C_{16}H_{19}O_2N$, melting-point, 75°, and echitenine, $C_{20}H_{27}O_4N$, melting-point, above 120°, are amorphous, bitter powders about which little is known. The following constituents have also been extracted from the bark:—Echicerin, a crystalline non-nitrogenous body; echicaoutchin, an amorphous substance resembling caoutchouc; echitin and echitein, both of which are crystalline, and echiretin, which is amorphous; all these constituents appear to be devoid of marked therapeutic properties. The bark of *A. constricta* contains the alkaloids, alstonine (chlorogenine), $C_{21}H_{20}O_3N_2$, and porphyrine. It also contains porphyrosine and alstonidine, about which little definite is known. Porphyrine is amorphous and colourless, and shows a blue fluorescence in acid solution.

Action and Uses.—Alstonia is used in India and the Eastern Colonies as a tonic in malarial conditions and as a remedy for chronic diarrhœa. Its value in malaria cannot be compared with that of cinchona bark, although it produces no bad effects such as cinchonism. For **administration**, the infusion (Infusum Alstoniæ, 1 in 20; dose, ½ to 1 fluid ounce) and the tincture (Tinctura Alstoniæ, 1 in 8; dose, ½ to 1 fluid drachm) may be employed.

ALTHÆA
(Alth.)

Althæa

Synonyms—Guimauve; Marshmallow; Marshmallow Root.

Althæa is the dried, peeled root of *Althæa officinalis* Linn. (Fam. Malvaceæ), a perennial plant widely distributed in Central and Southern Europe and cultivated in Belgium, France and Germany. The roots are collected in the autumn from plants not less than two years old, trimmed and scraped to remove the cork, and finally dried. They are sometimes split longitudinally or cut into transverse slices.

The root is yellowish-white in colour, straight and tapering, from 10

to 30 centimetres long and 10 to 20 millimetres in diameter, bearing deep and broad longitudinal furrows. The surface is softly fibrous and bears the brownish scars of lateral rootlets. The fracture is short, fibrous in the bark and granular in the wood; the fractured surface is whitish and starchy. The transverse section exhibits a moderately thick bark, separated from the wood by a greyish cambium line. The odour is faint and the taste mucilaginous.

The diagnostic **microscopical** features are the abundant bast fibres, which are unlignified except for the middle lamella and occur in groups of 3 to 25; the numerous starch grains, mostly simple and ovoid in shape, measuring about 4 to 25 microns in diameter; occasional cluster-crystals of calcium oxalate; numerous mucilage cells which stain red with solution of ruthenium red.

Althæa **contains** from 25 to 35 per cent. of mucilage, which consists of glucosan and xylan. It also contains about 1·7 per cent. of an oil composed of the glycerides of palmitic and oleic acids, together with butyric acid and a phytosterol apparently identical with sitosterol. A hydroxy-acid of high molecular weight appears to be present and also a lecithin in which palmitic and oleic acids occur and the base of which is choline. The sugar is mainly sucrose.

Standard.—Althæa contains not more than 2 per cent. of foreign organic matter. Ash, not more than 8 per cent. Cold water extractive, not less than 20 per cent.

Althæa, in powder (Pulvis Althææ : Pulv. Alth.), contains the constituents and possesses the diagnostic microscopical characters of Althæa, and complies with the limits for ash and cold water extractive of the unground drug.

Action and Uses.—Althæa is demulcent and emollient. Taken internally it is a popular remedy for catarrhs and bronchitis. It may be given in the form of syrup. Pâte de Guimauve pastilles, which contain althæa flavoured with oil of neroli, are a useful and pleasant demulcent. The powdered root is used as an excipient for pills which require some inert, absorbent substance. Althæa has been applied to inflamed tissues as a fomentation (1 part of powdered root to 5 parts of water), the macerated drug being used as a poultice.

ALTHÆÆ FOLIUM.—Althæa, or marshmallow, leaves are greyish-green, broadly ovate, or nearly cordate, somewhat 5-lobed, with unequal triangular teeth, and covered with a velvety felt of stellate hairs. They have a mucilaginous taste and are almost odourless. The leaf is used in the preparation of an ointment which has been recommended for its soothing and emollient effects in a variety of skin diseases. A factitious ointment is often sold which consists of a mild resin ointment.

Preparation

Syrupus Althææ, B.P.C.—(Syr. Alth.)—Syrup of Althæa. *Syn.*—Syrup of Marshmallow. A solution of sucrose in the liquid obtained by macerating althæa in distilled water, preserved with chloroform. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

ALUMEN
(Alum.)

Alum

Synonyms—Alumen Purificatum; Purified Alum.

Alum is either potassium aluminium sulphate, potash alum, ($KAl(SO_4)_2,12H_2O = 474{\cdot}4$) or ammonium aluminium sulphate, ammonia alum, ($NH_4Al(SO_4)_2,12H_2O = 453{\cdot}3$) and may be prepared by crystallising solutions containing aluminium sulphate and potassium or ammonium sulphate respectively. It occurs in colourless, transparent, octahedral crystals, or as a white powder, with a sweet and very astringent taste. When heated, alum at first dissolves in its water of crystallisation, and becomes anhydrous at about 200°. Roche alum was originally a native alum, but is now prepared artificially by colouring crystals of alum with red bole.

Soluble in water (potash alum, 1 in 10; ammonia alum, 1 in 8), boiling water (3 in 1), and glycerin (1 in 3); insoluble in alcohol.

Standard, B.P.—Potash alum and ammonia alum contain not less than 99·5 per cent. of $KAl(SO_4)_2,12H_2O$ and of $NH_4Al(SO_4)_2,12H_2O$, respectively. Arsenic limit, 5 parts per million. They comply also with tests for absence of copper and of zinc and with a limit test for iron. Potash alum complies with a test for the absence of ammonium salts, and ammonia alum complies with a limit test for alkali salts.

Action and Uses.—When taken internally the salts of aluminium are very slowly absorbed owing to their property of precipitating proteins. In small doses alum exerts an astringent action on the alimentary canal, more particularly the stomach; in larger doses it induces vomiting, and a strong solution may produce inflammation of the bowel and the stomach. Alum is not much employed internally, although it has been administered in the treatment of lead colic, and as an emetic in capillary bronchitis, spasmodic croup, food poisoning and narcotic poisoning. It is contra-indicated in corrosive poisoning and acute inflammation of the alimentary tract.

The astringency of salts of aluminium is due to their action in coagulating albumin. They coagulate protein on the surface of mucous membranes or on wounded surfaces. Alum is therefore used in solution as a local astringent in such conditions as stomatitis (about 1 per cent.), pharyngitis (about 4 per cent., applied by means of a spray), leucorrhœa (about 0·5 per cent.), gonorrhœa and gleet (about 0·5 per cent.) and in skin diseases (about 1 per cent.). Solutions containing from 0·5 to 2 per cent. are used in the treatment of purulent ophthalmia. As a gargle or spray for a relaxed throat, alum is used in combination with tincture of myrrh or acid infusion of roses. As an application to the mouth and throat for use in ulcerated conditions, pharyngitis, etc., glycerin of alum may be employed either as a paint or, diluted with eight parts of water or of acid infusion of roses, as a gargle or spray solution.

ALUMINII CHLORIDUM
(Alumin. Chlor.)

Aluminium Chloride

$AlCl_3,6H_2O = 241{\cdot}4$

Aluminium chloride may be prepared by the action of barium chloride on a solution of aluminium sulphate and subsequent crystallisation from the filtrate. It occurs in the form of nearly white, deliquescent crystals or as a granular, crystalline powder. It cannot be dehydrated without suffering decomposition; the anhydrous variety is obtained by passing chlorine over the metal. Aluminium chloride should be **stored** in closely stoppered bottles.

Very **soluble** in water (2 in 1), alcohol (1 in 4) and glycerin.

Standard.—Aluminium chloride, determined by the method of the British Pharmacopœia for Alumen, contains not less than 95 per cent. of $AlCl_3,6H_2O$; 1 gramme of residue is equivalent to 4·737 grammes of $AlCl_3,6H_2O$. 0·1 gramme complies with the limit test for iron.

Action and Uses.—Aluminium chloride has been given internally in locomotor ataxy and is said to relieve the pains. For internal use, it should be administered in the form of a mixture. Pills are occasionally prescribed, but on account of the deliquescent nature of the salt they are difficult to prepare and also to preserve; they are best massed with Canada balsam and powdered althæa. Aluminium chloride in solution is antiseptic and astringent, and is used in the form of gargle (1 in 500), spray (1 in 300), or pigment (1 in 100).

Dose.—0·12 to 0·25 gramme (2 to 4 grains).

ALUMINII HYDROXIDUM
(Alumin. Hydrox.)

Aluminium Hydroxide

$Al(OH)_3 = 78{\cdot}0$

Aluminium hydroxide may by prepared by the interaction of alum and sodium carbonate in solution. The precipitate is washed, dried at a temperature not exceeding 40°, and reduced to a fine powder. It occurs as a white, light, amorphous powder, which is odourless and tasteless.

Insoluble in water, soluble in solutions of sodium and potassium hydroxides.

Standard.—Aluminium hydroxide loses, on heating to redness, not more than 34 per cent. of its weight. Arsenic limit, 20 parts per million. Boil 1 gramme with 20 millilitres of water and filter; on evaporating the filtrate and gently igniting, the residue weighs not more than 0·02

gramme (limit of alkali salts). 1 gramme with 2·5 millilitres of hydrochloric acid complies with the limit test for sulphates.

Action and Uses.—Aluminium hydroxide is employed as a protective agent for the gastric mucous membrane in cases of gastric or duodenal ulcer associated with hyperacidity. **Externally** it is used in the form of a dusting powder, aqueous suspension, or ointment as a mild astringent and desiccant.

Dose.—0·3 to 0·6 gramme (5 to 10 grains).

ALUMINII ACETAS.—Aluminium acetate, $Al_2(C_2H_3O_2)_6$, may be prepared by dissolving freshly precipitated aluminium hydroxide in strong acetic acid, or by precipitating a solution of aluminium sulphate with lead acetate; it can be obtained as a soluble, gummy mass, but it is chiefly used in solution, in the form of Liquor Aluminii Acetatis, as an astringent in lotions and mouth-washes.

ALUMINII SUBACETAS.—Aluminium subacetate, $Al_2O_3,4C_2H_3O_2,4H_2O$, may be prepared by dissolving aluminium hydroxide in acetic acid, or by decomposing aluminium sulphate with lead acetate, and heating the solution. It is a basic salt, and occurs as a light, white powder, sparingly soluble in water.

ALUMINII ACETO-TARTRAS.—Aluminium aceto-tartrate may be prepared by dissolving freshly precipitated aluminium hydroxide in a mixture of acetic and tartaric acids. It occurs in colourless crystals or scales, or as a crystalline powder, soluble in water (1 in 2), but insoluble in alcohol and ether.

Preparation

Liquor Aluminii Acetatis, B.P.C.—(Liq. Alumin. Acet.)—Solution of Aluminium Acetate. *Syn.*—Liquor Aluminii Aceticus; Burow's Solution. A solution containing a basic aluminium acetate equivalent to about 2·5 per cent. w/v of aluminium oxide.

ALUMINII SULPHAS
(Alumin. Sulph.)

Aluminium Sulphate

$Al_2(SO_4)_3,16H_2O = 630·4$

Aluminium sulphate may be prepared by dissolving freshly precipitated aluminium hydroxide in diluted sulphuric acid and allowing the solution to crystallise. It occurs as a white powder or in crystalline masses. Heated to 200°, it loses its water of crystallisation.

Soluble in water (1 in 1), the solution having an acid reaction; insoluble in alcohol.

Standard.—Aluminium sulphate, determined by the method of the British Pharmacopœia for Alumen, contains not less than 99 per cent. of $Al_2(SO_4)_3,16H_2O$; 1 gramme of residue is equivalent to 6·184 grammes of $Al_2(SO_4)_3,16H_2O$. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. On the addition of an equal volume of N/10 sodium thiosulphate to a filtered 10 per cent. solution of the salt, not more than a faint opalescence develops within five minutes (limit of free acid). 0·1 gramme complies with the limit test for iron.

Action and Uses.—Aluminium sulphate has the same medicinal properties as alum, but its astringent action is somewhat more pronounced. It is given **internally** as an astringent in the form of a mixture. A saturated solution is employed as a mild caustic for enlarged tonsils, nasal polypi, and in other conditions where a mild caustic is indicated. Solutions (5 to 10 per cent.) are used as local applications to ulcers, and to stop foul discharges from mucous surfaces. A 2 per cent. solution is used for removing wrinkles.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

AMIDOPYRINA
(Amidopyrin.)

Amidopyrine

$C_{13}H_{17}ON_3 = 231·2$

Amidopyrine, or 4-dimethylamino-1-phenyl-2 : 3-dimethyl-5-pyrazolone, is dimethylaminophenazone. It may be prepared by the reduction of nitrosophenazone and treatment of the aminophenazone so obtained with methyl iodide. Amidopyrine occurs in small, colourless crystals, or as a white, crystalline powder, and is odourless and almost tasteless. The addition of ferric chloride solution to an aqueous solution of amidopyrine produces a bluish-violet colour, becoming violet-red on the addition of dilute sulphuric acid. Silver nitrate solution gives an intense violet colouration followed by a black precipitate of silver. A violet colour is also produced on adding a trace of sodium nitrite to a faintly acid solution of amidopyrine, the colour fading when the mixture is warmed. Potassium ferricyanide solution, followed by a few drops of ferric chloride solution, gives a dark bluish-green colour. These tests distinguish amidopyrine from phenazone and from acetanilide.

Soluble in water (about 1 in 18), alcohol (about 1 in 2), ether, chloroform and benzene.

Standard, B.P.—Amidopyrine melts at 107° to 109°. Ash, not more than 0·1 per cent. It complies also with a limit test for readily carbonisable substances.

Action and Uses.—Amidopyrine is analgesic and antipyretic, resembling phenazone in its action, but it is effective in smaller doses; its action is exerted somewhat more slowly, is of longer duration and it is stated to be without harmful effect on the heart, kidneys or blood. It has been recommended for use in pneumonia, erysipelas and the acute infectious fevers, such as typhoid fever. It is said to be almost specific in measles and, if given in the early stages, to be capable of aborting an attack. It has also been used largely in chronic tuberculosis, neuralgia, sciatica, migraine and dysmenorrhœa. Amidopyrine may be prescribed with barbituric acid derivatives for its

analgesic effect in the treatment of migraine and neuralgia. It is administered as powder, or in cachets, capsules, or tablets. It is **incompatible** with oxidising agents, nitrites, apomorphine and acacia.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

AMIDOPYRINÆ SALICYLAS.—Amidopyrine salicylate occurs as a white, crystalline powder. It may be administered in the form of tablets, each containing 0·3 gramme (5 grains), for the pain of neuralgia and rheumatism.

AMIDOPYRINÆ CAMPHORAS.—Amidopyrine camphorate has been used to diminish the sweats of phthisis. Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Preparation

Tabellæ Barbitoni et Amidopyrinæ, B.P.C.—(Tab. Barbiton. et Amidopyrin.)—Tablets of Barbitone and Amidopyrine. Each tablet contains 2 grains of barbitone and 4 grains of amidopyrine. Dose.– 1 tablet.

AMMONIACUM
(Ammoniac.)

Ammoniacum

Ammoniacum is a gum-resin obtained from the flowering and fruiting stem of *Dorema Ammoniacum* Don. (Fam. Umbelliferæ) and possibly other species. The plants, which are widely distributed throughout Persia, extending into Southern Siberia, are visited by beetles; the stems are punctured and an exudation induced of the secretion contained in the schizogenous ducts of the cortex. The exudation, which dries on the stem in the form of tears, is collected.

The gum-resin is composed of separate, pale yellow tears or nodular masses, darkening with age and varying from 0·5 to 3·0 centimetres in diameter. It is brittle when cold, softening on warming, having a characteristic, but not a strong odour, and a bitter, acrid taste. The fractured surface is white or pale brown in colour. When the powdered drug is extracted with ether, the solution acquires a violet colour on the addition of a drop of ferric chloride solution and a small crystal of sodium carbonate.

Ammoniacum **contains** volatile oil (0·1 to 0·3 per cent.), resin (65 to 70 per cent.) and a gum resembling acacia. The resin consists of a resene (20 per cent.) associated with ammoresinotannol combined with salicylic acid. Traces of free salicylic acid are also present.

Substitutes.—A part of the exudation falls to the ground forming block or lump ammoniacum which consists of particles of gum-resin agglutinated together with a bluish, resinous substance, often being admixed with stones, fragments of the stem fruit and other debris. Moroccan ammoniacum, derived from *Ferula communis* Linn. var. *nodiflora* Linn., and the Cyrenian drug, from *Ferula marmarica* Aschers and Taub., are occasionally met with in commerce

Standard.—Ammoniacum yields to alcohol (90 per cent.) not less

than 60 per cent. of extractive. Ash, not more than 7 per cent. An orange-red colouration is produced on adding solution of chlorinated soda to an emulsion of ammoniacum with water (distinction from the Moroccan drug). The solution obtained by boiling 0·2 gramme of the coarsely powdered gum-resin for a few minutes with 2 millilitres of hydrochloric acid and then diluting with an equal volume of water, does not exhibit a blue fluorescence when filtered and made alkaline with solution of ammonia (absence of asafetida and Moroccan ammoniacum).

Action and Uses.—Internally, ammoniacum facilitates expectoration and is of value in chronic bronchitis, especially in the aged, when the secretion is tough and viscid. It has a mild diuretic action. **Externally,** it acts as a slight irritant in virtue of the essential oil that it contains. Ammoniacum is a constituent of Pilulæ Scillæ Compositæ and Pilulæ Ipecacuanhæ cum Scilla.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparation

Mistura Ammoniaci, B.P.C.—(Mist. Ammoniac.)—Ammoniacum Mixture. Each fluid ounce contains the aqueous extractive from about 13 grains of ammoniacum, with syrup of tolu and distilled water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This mixture was included in the British Pharmacopœia, 1914.

AMMONII ACETAS

(Ammon. Acet.)

Ammonium Acetate

$C_2H_3O_2(NH_4) = 77·06$

Ammonium acetate, $CH_3 \cdot COONH_4$, may be obtained by neutralising acetic acid with ammonia. It occurs in white crystals, or crystalline masses. Its solution in water is always acid to litmus.

Very **soluble** in water and alcohol.

Standard.—Ammonium acetate, determined by the method of the British Pharmacopœia for Liquor Ammonii Acetatis Fortis, contains not less than 98 per cent. of $C_2H_3O_2(NH_4)$. Residue on gentle ignition, not more than 0·05 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. 0·5 gramme complies with the limit test for iron.

Action and Uses.—Ammonium acetate has the action of a typical saline that is easily absorbed. It is converted in the tissues of the body into urea, which exerts a diuretic action. As a mild expectorant, diuretic and diaphoretic, ammonium acetate is employed in febrile conditions, particularly those of childhood. It is **administered** as Liquor Ammonii Acetatis Dilutus.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

Preparations

Liquor Ammonii Acetatis Dilutus, B.P.—(Liq. Ammon. Acet. Dil.)—Dilute Solution of Ammonium Acetate. *Syn.*—Liquor Ammonii Acetatis; Solution of Ammonium Acetate; Mindererus Spirit. Strong solution of ammonium acetate, 1 in 8. It contains 7·2 per cent. w/v of $C_2H_3O_2(NH_4)$ (limits, 6·9 to 7·5) and has a reaction of between *p*H 7·0 and *p*H 8·0. Arsenic limit, 0·5 part per million. Lead limit, 0·6 part per million. It should be stored in bottles of lead-free glass. Dose.– 8 to 30 millilitres (½ to 1 fluid ounce).

Liquor Ammonii Acetatis Fortis, B.P.—(Liq. Ammon. Acet. Fort.)—Strong Solution of Ammonium Acetate. It is prepared by neutralising glacial acetic acid with ammonium carbonate and strong solution of ammonia, and contains 57·5 per cent. w/v of $C_2H_3O_2(NH_4)$ (limits, 55 to 60). Specific gravity, about 1·098. The reaction of a mixture of 1 millilitre with 10 millilitres of water is between *p*H 7·0 and *p*H 8·0. Arsenic limit, 4 parts per million. Lead limit, 5 parts per million. It should be stored in bottles of lead-free glass. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Mistura Ammonii Acetatis Composita, B.P.C.—(Mist. Ammon. Acet. Co.)—Compound Ammonium Acetate Mixture. *Syn.*—Mistura Diaphoretica. Each fluid ounce contains 20 grains of potassium citrate and 20 minims each of strong solution of ammonium acetate, spirit of nitrous ether and spirit of chloroform, with camphor water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

AMMONII BENZOAS

(Ammon. Benz.)

Ammonium Benzoate

$C_7H_5O_2(NH_4) = 139·1$

Ammonium benzoate, $C_6H_5{\cdot}COONH_4$, is formed by the combination of benzoic acid and ammonia. It occurs in white, scaly, almost odourless crystals. The salt usually has a feebly acid reaction due to loss of ammonia on keeping; such acid samples are less soluble than the freshly prepared salt. There are two varieties of the salt; they are made from natural and synthetic benzoic acids respectively.

Soluble in water (1 in 6), alcohol (1 in 30) and glycerin (1 in 8).

Standard.—Ammonium benzoate contains not less than 98 per cent. of $C_7H_5O_2(NH_4)$. Ash, not more than 0·1 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million.

Assay.—Dissolve 3 grammes, accurately weighed, in 25 millilitres of water in a separator, add 50 millilitres of N/2 sulphuric acid, and shake with 50 millilitres of ether; allow to separate, run off the lower layer and shake it with a further 25 millilitres of ether; run the aqueous layer into a titration flask, wash the mixed ethereal layers with 10 millilitres of water and add the washings to the contents of the flask; add 1 drop of methyl red indicator and titrate with N/2 sodium hydroxide to the orange end-point; each millilitre of N/2 sulphuric acid is equivalent to 0·06954 gramme $C_7H_5O_2(NH_4)$.

Action and Uses.—Ammonium benzoate, when given orally, increases slightly the acidity of the urine and is employed in catarrh

of the bladder and in phosphaturia. It is doubtful if it exerts any antiseptic action in the bladder, since, after ordinary doses of ammonium benzoate, the urine does not reach the degree of acidity necessary for the inhibition of bacterial growth. Ammonium benzoate is employed in chronic bronchitis in cases when the mucus is tenacious and difficult to remove by coughing.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

AMMONII BICARBONAS
(Ammon. Bicarb.)

Ammonium Bicarbonate

$NH_4HCO_3 = 79·05$

Ammonium bicarbonate may be prepared by passing carbon dioxide into a solution of ammonia or by treating ammonium carbonate with alcohol, when the carbamate dissolves and the bicarbonate remains undissolved. It occurs as a fine, white, crystalline powder or in white, rhomboid crystals, and is slightly hygroscopic. It has an odour of ammonia and a pungent taste, but is less caustic than the carbonate. It volatilises slowly at ordinary temperatures, but rapidly at 60°, giving ammonia, carbon dioxide and water.

Soluble in water (1 in 5½); insoluble in alcohol.

Standard, B.P.—Ammonium bicarbonate contains not less than 98 per cent. and not more than the equivalent of 102 per cent. of NH_4HCO_3. Residue on volatilisation, not more than 0·01 per cent. Arsenic limit, 2 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for tarry matter, chloride, sulphate and iron.

Action and Uses.—Ammonium bicarbonate has been used as a stimulant in place of ammonium carbonate, but it is rarely prescribed as such. It is suitable for use in effervescing draughts and to replace ammonium carbonate in the preparation of tablets and capsules.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

AMMONII BROMIDUM
(Ammon. Brom.)

Ammonium Bromide

$NH_4Br = 97·96$

Ammonium bromide may be prepared by the combination of hydrobromic acid with ammonia, or by the action of ammonium

carbonate on a solution of iron bromide. It occurs as colourless crystals or as a white, crystalline powder.

Soluble in water (2 in 3), alcohol (1 in 13).

Standard.—Ammonium bromide, determined by the method of the British Pharmacopœia for Potassii Bromidum, contains not less than 98 per cent. of NH_4Br, calculated on the salt dried at 100°; each millilitre of N/10 silver nitrate is equivalent to 0·009796 gramme of NH_4Br. Loss on drying at 100°, not more than 1 per cent. Sulphated ash, not more than 0·1 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. Chloride, by the method for chloride in Potassii Bromidum, not more than 1·3 millilitres of N/10 silver nitrate. 2 grammes complies with the limit test for sulphates. 0·5 gramme complies with the limit test for iron. 1 gramme complies with the limit test for bromate in Potassii Bromidum.

Action and Uses.—The action of ammonium bromide is the same as that of potassium bromide, with the exception that it is absorbed a little more rapidly and is somewhat less depressing. As a general sedative, ammonium bromide is usually given in mixture form. For local application to the throat a linctus may be sipped, or lozenges or pastilles sucked slowly, but since the action of ammonium bromide is on the central nervous system, local applications have no special advantage. Ammonium bromide is **incompatible** with spirit of nitrous ether.

Dose.– 0·3 to 2 grammes (5 to 30 grains).

Preparations

Ammonii Bromidum Effervescens, B.P.C.—(Ammon. Brom. Efferv.)—Effervescent Ammonium Bromide. About 1 in 12½. Dose.– 5 to 30 grammes (75 grains to 1 ounce).

Mistura Bromidi Composita, B.P.C.—(Mist. Brom. Co.)—Compound Mixture of Bromides. One fluid ounce contains 10 grains each of the bromides of ammonium, potassium and sodium, with tincture of nux vomica, solution of carmine, glycerin and chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

AMMONII CARBONAS
(Ammon. Carb.)
Ammonium Carbonate

Ammonium carbonate is a mixture of ammonium bicarbonate ($NH_4HCO_3 = 79·05$) and ammonium carbamate ($NH_4NH_2CO_2 = 78·06$) in varying proportions, and may be prepared by sublimation from a mixture of calcium carbonate and an ammonium salt. It occurs in hard, crystalline, translucent masses with a striated appearance; it has a strong odour of ammonia and a pungent, ammoniacal taste. On

exposure to the air it undergoes partial dissociation, with loss of ammonia and formation of a white efflorescence of ammonium bicarbonate. Ten parts of ammonium carbonate will neutralise approximately 13·3 parts of citric acid, or 14·3 parts of tartaric acid. It should be **stored** in well-closed containers.

Soluble in water (1 in 4) and glycerin (1 in 5); partly soluble in alcohol.

Standard, B.P.—Ammonium carbonate contains the equivalent of not less than 30 per cent. and not more than 32·5 per cent. of NH_3. Residue on volatilisation at a temperature below a red heat, not more than 0·025 per cent. Arsenic limit, 2 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for tarry matter, sulphate, chloride and iron.

Action and Uses.—The action of ammonium carbonate depends on the fact that it readily liberates ammonia. Ammonium carbonate mildly stimulates the gastric mucous membrane and is administered in certain forms of flatulent dyspepsia. It is a valuable expectorant and acts both reflexly on the medulla through irritation of the stomach and directly on the bronchial mucous membrane like any other saline. In large doses it causes vomiting. After absorption ammonium carbonate is changed to urea and causes some diuresis, but, unlike the carbonates of sodium and potassium, it does not render the blood more alkaline. Its employment in cases of sudden heart failure depends on its reflex effects from the respiratory and gastric mucous membranes.

It is generally **administered,** freely diluted, in mixtures, and is often given with tincture of ipecacuanha and infusion of senega. Single doses of 1·2 grammes (20 grains) in a draught of milk have been given in cases of acute pneumonia. Spiritus Ammoniæ Aromaticus is employed as a stimulant and anti-spasmodic, and is especially useful with potassium or ammonium bromide in nervous headache and hysterical conditions. It is carminative and stimulates the heart and respiration reflexly, and is employed as a restorative in fainting.

Solutions of ammonium carbonate are used as applications to insect bites and wasp stings. It is used largely as "smelling salts" which, by irritating the nasal mucous membrane, act reflexly on the medullary centres. Inhalation of ammonia gas in this way produces constriction of the peripheral arterioles with a rise in blood pressure, stimulation of respiration, and a quicker and more forcible heart-beat. For this reason, it is employed in fainting and collapse and in any condition in which it is desirable to rouse the medullary centres. For dispensing purposes, freshly crushed ammonium carbonate or a solution (1 in 8) should be employed.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Preparations

Liquor Ammoniæ Aromaticus, B.P.C.—(Liq. Ammon. Aromat.)—Aromatic Solution of Ammonia. An aqueous solution of the same ammoniacal strength as aromatic spirit of ammonia. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Mistura Ammoniæ cum Senega, B.P.C.—(Mist Ammon. c. Seneg.)—Ammonia Mixture with Senega. Each fluid ounce contains 4 grains of ammonium carbonate and 5 grains of ammonium chloride, with tincture of ipecacuanha and infusion of senega. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Spiritus Ammoniæ Aromaticus, B.P.—(Sp. Ammon. Aromat.)—Aromatic Spirit of Ammonia. *Syn.*—Spirit of Sal Volatile. It is prepared from ammonium carbonate, strong solution of ammonia, oil of lemon, oil of nutmeg, alcohol (90 per cent.) and distilled water. It contains ammonia and ammonium carbonate together equivalent to not less than 2·1 per cent. and not more than 2·4 per cent w/v of NH_3, and not less than 1·265 per cent. and not more than 1·485 per cent. w/v of CO_2. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

AMMONII CHLORIDUM

(Ammon. Chlorid.)

Ammonium Chloride

$NH_4Cl = 53·5$

Ammonium chloride may be obtained by neutralising a solution of ammonia with hydrochloric acid and purifying the product. It occurs as a white, granular, crystalline powder which is slightly hygroscopic. It is odourless and has a cooling, saline taste.

Soluble in water (about 1 in 3) and alcohol (about 1 in 60).

Standard, B.P.—Ammonium chloride contains not less than 99·5 per cent. of NH_4Cl, calculated on the substance dried in a vacuum desiccator over sulphuric acid. Loss on drying for twenty-four hours in a vacuum desiccator over sulphuric acid, not more than 1 per cent. Residue on volatilisation by gentle heat, not more than 0·1 per cent. Arsenic limit, 5 parts per million. Lead limit, 5 parts per million. It complies also with a test for the absence of barium, and with limit tests for sulphate and iron.

Action and Uses.—Ammonium chloride is rapidly absorbed from the stomach and small intestine, exerting the mildly expectorant, diaphoretic and diuretic actions of an ordinary saline. It increases the secretion of bronchial mucus, and is given to assist expectoration. Ammonium chloride, given by the mouth, increases the acidity of the urine. In painful conditions such as neuralgia and lumbago, in which there is an inflammatory exudate, ammonium chloride in doses of 2 grammes (30 grains) given three times daily may be beneficial. Administered hypodermically it causes pronounced stimulation of the central nervous system, but when given by the mouth, on account of its rapid excretion, this effect is wanting. In cases of lead poisoning, ammonium chloride, 1 to 2 grammes (15 to 30 grains) a day in divided doses, has been recommended to create a relative acidosis which hastens the elimination of the lead. A 1 per cent. solution of ammonium chloride may be used as a spray or gargle in acute pharyngitis and laryngitis; lozenges and pastilles containing 0·12 or 0·2 gramme (2 or 3 grains) of the salt are also used. A 2 per cent. solution in alcohol (50 per cent.) is useful as a lotion for contusions. Ammonium chloride is

used as an inhalation by placing solution of ammonia and hydrochloric acid separately in a suitable apparatus so that air drawn through it will pass first through the solution of ammonia and then through the hydrochloric acid, the resulting ammonium chloride being purified before inhalation by passing it through water or a moist sponge. Large doses of ammonium chloride may cause nausea, vomiting and thirst. Liquid extract of liquorice may be used to disguise its nauseous taste.

Dose.– 0·3 to 4 grammes (5 to 60 grains).

Preparations

Pastilli Ammonii Chloridi Compositi, B.P.C.—(Pastill. Ammon. Chlorid. Co.)—Compound Ammonium Chloride Pastilles. Each pastille contains 2 grains of ammonium chloride and 2 minims of liquid extract of liquorice.

Trochisci Ammonii Chloridi Compositi, B.P.C.—(Troch. Ammon. Chlorid. Co.)—Compound Ammonium Chloride Lozenges. *Syn.*—Trochisci Ammonii Chloridi et Glycyrrhizæ. Each lozenge contains 3 grains of ammonium chloride and 3 grains of extract of liquorice.

AMMONII CITRAS
(Ammon. Cit.)

Ammonium Citrate

$C_6H_5O_7(NH_4)_3,H_2O = 261·2$

Ammonium citrate, $C_3H_4(OH)(COONH_4)_3,H_2O$, is prepared by neutralising citric acid with ammonia. It occurs in the form of a very deliquescent, crystalline powder, which tends to lose ammonia and become partly converted into an acid salt.

Very **soluble** in water, the solution having a neutral or slightly acid reaction.

Standard.—Ammonium citrate, determined by the method of the British Pharmacopœia for Liquor Ammonii Acetatis Fortis, contains not less than 90 per cent. of $C_6H_5O_7(NH_4)_3,H_2O$; each millilitre of N/1 sodium hydroxide is equivalent to 0·08706 gramme of $C_6H_5O_7(NH_4)_3,H_2O$. Residue on gentle ignition, not more than 0·05 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million.

Action and Uses.—Ammonium citrate is a mild expectorant and diuretic; in very large doses it acts as a laxative. It is absorbed in part and converted in the tissues into the carbonate and ultimately into urea; hence, unlike the tartrates and citrates of the fixed alkalis, it does not increase the alkalinity of the urine. It should not, therefore, be administered to patients suffering from the uric acid diathesis. It is generally prescribed in the form of Liquor Ammonii Citratis Dilutus for the same purpose as solution of ammonium acetate. An effervescent alkaline solution of ammonium citrate, containing approximately 20 grains of ammonium citrate, is prepared by adding 1·1 grammes (17

grains) of citric acid to a solution of 1 gramme (15 grains) of ammonium carbonate.

Dose.– 2 to 4 grammes (½ to 1 drachm).

Preparations

Liquor Ammonii Citratis Dilutus, B.P.C.—(Liq. Ammon. Cit. Dil.)—Dilute Solution of Ammonium Citrate. *Syn.*—Liquor Ammonii Citratis; Solution of Ammonium Citrate. Strong solution of ammonium citrate, 1 in 4, with distilled water. Dose.– 8 to 24 millilitres (2 to 6 fluid drachms).

This solution, prepared from 12·5 per cent. w/v of citric acid and a sufficient quantity of ammonium carbonate, was included in the British Pharmacopœia, 1914, under the name of Liquor Ammonii Citratis.

Liquor Ammonii Citratis Fortis, B.P.C.—(Liq. Ammon. Cit. Fort.)—Strong Solution of Ammonium Citrate. It contains about 58 per cent. w/v of ammonium citrate. Dose.– 2 to 6 millilitres (½ to 1½ fluid drachms).

AMMONII HIPPURAS

(Ammon. Hipp.)

Ammonium Hippurate

$C_9H_8O_3N(NH_4) = 196·1$

Ammonium hippurate, $C_6H_5·CO·NH·CH_2·COONH_4$, is the ammonium salt of hippuric acid or benzoylaminoacetic acid, $C_6H_5·CO·NH·CH_2·COOH$, which may be obtained from the urine of herbivorous animals, or synthesised by the action of benzoyl chloride on aminoacetic acid. It may be prepared by suspending hippuric acid in 3 parts of water, warming gently, and adding sufficient strong solution of ammonia to render the mixture slightly alkaline to litmus. The liquid is then filtered through decolourising carbon and the filtrate concentrated to about one-third of its original volume. Finally, sufficient ammonia is added to produce a slightly alkaline reaction and the solution is poured into 7 volumes of acetone, with continuous stirring, the precipitated salt being collected and dried. It occurs in small, white, or brownish-white crystals, having no pronounced or unpleasant odour. When heated with strong solution of sodium hydroxide, ammonia is evolved and the hippuric acid is hydrolysed with formation of sodium benzoate, from which benzoic acid may be precipitated by adding an excess of hydrochloric acid. It is deliquescent, losing ammonia on exposure, with formation of hippuric acid, and should be **stored** in well-closed containers.

Soluble in water and in alcohol (1 in 20).

Standard.—Ammonium hippurate, determined by the Kjeldahl method, contains not less than 14·00 per cent. of N, equivalent to not less than 98 per cent. of $C_9H_8O_3N(NH_4)$. Residue on ignition, not more than 0·2 per cent. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. Dissolve 1 gramme in 40 millilitres of water, add 1 millilitre of nitric acid and filter; the filtrate complies with the limit test

for chlorides. Dissolve 1 gramme in 40 millilitres of water, add 1 millilitre of hydrochloric acid and filter; the filtrate complies with the limit test for sulphates.

Action and Uses.—Ammonium hippurate and other salts of hippuric acid have been given in the treatment of gouty conditions. They are said to lower blood pressure, and for this purpose are usually administered together with the other substances commonly used in the treatment of arterial hypertension.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

LITHII HIPPURAS.—Lithium hippurate, $C_6H_5 \cdot CO \cdot NH \cdot CH_2 \cdot COOLi, 2H_2O$, occurs as glistening white plates or as a white powder, soluble in about 3 parts of water. Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

POTASSII HIPPURAS.–Potassium hippurate, $C_6H_5 \cdot CO\ NH \cdot CH_2\ COOK, H_2O$, is deliquescent and soluble in less than half its weight of water. Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

SODII HIPPURAS.—Sodium hippurate, $C_6H_5 \cdot CO\ NH\ CH_2 \cdot COONa$, is obtained, when crystallised from alcohol, with $1\frac{1}{2}$ molecules of water. It is soluble in about half its weight of water. Dose.– 0 3 to 1·2 grammes (5 to 20 grains).

AMMONII IODIDUM

(Ammon. Iod.)

Ammonium Iodide

$NH_4I = 145·0$

Ammonium iodide may be prepared by the action of ammonium carbonate on solution of iron iodide or zinc iodide. It occurs as a white, deliquescent, crystalline powder, which gradually becomes yellowish on exposure to air, owing to loss of ammonia and liberation of iodine. It has a sharp, saline taste, but no odour of iodine. It should be **stored** in well-stoppered, amber-coloured bottles, protected from light.

Soluble in water (1 in 1), alcohol (1 in 3) and glycerin (3 in 4).

Standard.—Ammonium iodide, determined by the method of the British Pharmacopœia for Potassii Iodidum, contains not less than 98 per cent. of NH_4I, calculated on the substance dried at 100°; each millilitre of M/20 potassium iodate is equivalent to 0·0145 gramme of NH_4I. Loss on drying at 100°, not more than 5 per cent. Sulphated ash, not more than 0·1 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. 2 grammes complies with the limit test for sulphates.

Action and Uses.—Ammonium iodide in its action is similar to sodium and potassium iodides, but it is somewhat more rapidly absorbed from the alimentary canal. A 10 per cent. solution in glycerin is sometimes applied to enlarged tonsils.

Dose.– 0·12 to 0·4 gramme (2 to 6 grains).

AMMONII PERSULPHAS
(Ammon. Persulph.)

Ammonium Persulphate

$(NH_4)_2S_2O_8 = 228{\cdot}2$

Ammonium persulphate may be prepared by the electrolysis of a solution of ammonium sulphate. The best yields are obtainable by keeping the solution cool and employing a high current density in a cell in which the anolyte is a saturated solution of ammonium sulphate and the catholyte a diluted sulphuric acid of specific gravity 1·3. It occurs in white, monoclinic crystals, and is stable when preserved in a dry condition. Solutions, when freshly prepared, possess powerful oxidising properties, but do not decolourise potassium permanganate or liberate iodine from potassium iodide. On standing or on heating, solutions decompose and give reactions characteristic of sulphates. Silver nitrate yields a black precipitate of silver peroxide, and when a concentrated solution containing a little ammonia is treated with silver nitrate a vigorous evolution of nitrogen takes place.

Soluble in water (1 in 2), with a considerable fall in temperature; insoluble in dehydrated alcohol.

Standard.—Ammonium persulphate contains not less than 98 per cent. of $(NH_4)_2S_2O_8$. Residue on ignition, not more than 0·1 per cent.

Assay.—Dissolve about 0·5 gramme, accurately weighed, in 10 millilitres of water, add 50 millilitres of N/10 oxalic acid and a solution of 0·2 gramme of silver sulphate in 20 millilitres of dilute sulphuric acid; heat on a water-bath until no more carbon dioxide is evolved, dilute to about 100 millilitres and titrate the excess of oxalic acid with N/10 potassium permanganate; each millilitre of N/10 oxalic acid is equivalent to 0·01141 gramme of $(NH_4)_2S_2O_8$.

Action and Uses.—Ammonium persulphate forms the starting point in the preparation of the persulphates and, on account of its powerful oxidising action, is employed largely as a reagent in the manufacture of carbon compounds, and in deodorising and decolourising oils, fats and soaps. The salt is used also in photography for reducing dense negatives; it acts by oxidising and then dissolving part of the silver. Ammonium persulphate removes the stains caused by pyrogallol.

AMMONII PHOSPHAS
(Ammon. Phosph.)

Ammonium Phosphate

Ammonium phosphate is prepared by the combination of ammonia and phosphoric acid. The salt is a mixture of diammonium hydrogen phosphate, $(NH_4)_2HPO_4$, and ammonium dihydrogen phosphate,

$NH_4H_2PO_4$. It occurs in colourless, prismatic crystals which lose ammonia on exposure to air. Its aqueous solution is neutral or alkaline to litmus. It should be **stored** in well-closed containers.

Soluble in water (1 in 2); insoluble in alcohol.

Standard.—Ammonium phosphate yields not less than 22 per cent. of NH_3. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. 1 gramme complies with the limit tests for chlorides, sulphates and iron.

Assay.—To about 1 gramme, accurately weighed, dissolved in 200 millilitres of water, add 25 millilitres of a 25 per cent. solution of sodium hydroxide in water. Distil the liberated ammonia into 50 millilitres of N/2 sulphuric acid and titrate the excess of acid with N/2 sodium hydroxide using methyl red as indicator; each millilitre of N/2 sulphuric acid is equivalent to 0·008516 gramme of NH_3.

Action and Uses.—Ammonium phosphate has a typical saline action and is used mainly for its diuretic effect. It is not so easily absorbed as most of the ammonium salts; during excretion it renders the urine slightly more acid. It is occasionally administered in mixtures.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

AMMONII SALICYLAS

(Ammon. Salicyl.)

Ammonium Salicylate

$C_7H_5O_3(NH_4) = 155·1$

Ammonium salicylate, $C_6H_4(OH)·COONH_4$, may be obtained by the interaction of ammonia and salicylic acid. It occurs in colourless, almost odourless crystals, or as a white, crystalline powder with a sweetish taste.

Soluble in water (1 in 1) and alcohol (1 in 2·5).

Standard.—Ammonium salicylate, determined by the method for Ammonii Benzoas, contains not less than 98 per cent. of $C_7H_5O_3(NH_4)$; each millilitre of N/2 sulphuric acid is equivalent to 0·07754 gramme of $C_7H_5O_3(NH_4)$. Ash, not more than 0·1 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million.

Action and Uses.—The action of this salt is similar to that of sodium salicylate, except that the ammonium salt is more quickly absorbed into the system, but it is a fallacy to suppose that ammonium salicylate is less depressant to the central nervous system than is sodium salicylate. It may be **administered** in mixtures, powders, or cachets, but, in consequence of its liability to cause gastric disturbance, it should not be given too frequently or in too large a dose.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

AMMONII SULPHAS
(Ammon. Sulph.)

Ammonium Sulphate

$(NH_4)_2SO_4 = 132{\cdot}1$

Ammonium sulphate is obtained from the ammoniacal liquor of the gas works or from synthetic ammonia by neutralisation with sulphuric acid, and purification by subsequent crystallisation. It occurs in colourless, transparent, rhombic prisms which are odourless and have a sharp, saline taste. It is permanent in the air and its aqueous solution has a neutral reaction. It melts at 140° and decomposes at about 260°.

Soluble in water (about 3 in 4); insoluble in alcohol.

Standard.—Ammonium sulphate leaves, on strongly heating, not more than 0·02 per cent. of residue. Arsenic limit, 10 parts per million. Lead limit, 20 parts per million. 5 grammes complies with the limit test for chlorides. 1 gramme complies with the limit test for iron.

Action and Uses.—The sulphate differs from other ammonium salts in that it is absorbed with difficulty from the intestines, and hence acts as a mild saline aperient. It is rarely employed in medicine. It is used for fractional precipitation of proteins from solution. Crude ammonium sulphate is largely used as a fertiliser.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

AMMONII TARTRAS
(Ammon. Tart.)

Ammonium Tartrate

$C_4H_4O_6(NH_4)_2 = 184{\cdot}1$

Ammonium tartrate, $(CHOH{\cdot}COONH_4)_2$, may be prepared by neutralising a solution of tartaric acid with solution of ammonia and evaporating, keeping the solution neutral by the addition of ammonia. It occurs in colourless, somewhat efflorescent crystals.

Readily **soluble** in water.

Standard.—Ammonium tartrate contains not less than 98 per cent. of $C_4H_4O_6(NH_4)_2$. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. 1 gramme complies with the limit tests for chlorides and sulphates.

Assay.—Dissolve 2 grammes, accurately weighed, in 50 millilitres of water, add 12 millilitres of solution of formaldehyde previously neutralised to phenolphthalein and titrate with N/2 sodium hydroxide using phenolphthalein as indicator; each millilitre of N/2 sodium hydroxide is equivalent to 0·04603 gramme of $C_4H_4O_6(NH_4)_2$.

Action and Uses.—Ammonium tartrate has mild, diuretic and diaphoretic properties. Its chief use in medicine is in the treatment by irrigation of lime burns of the conjunctiva. For this purpose a 10 per cent. neutral solution is used.

AMYDRICAINÆ HYDROCHLORIDUM

(Amydricain. Hydrochlor.)

Amydricaine Hydrochloride

$C_{16}H_{26}O_2N_2,HCl = 314{\cdot}7$

Amydricaine hydrochloride is benzoyltetramethyldiaminodimethylethylcarbinol hydrochloride, $C_6H_5{\cdot}COOC(C_2H_5)[CH_2N(CH_3)_2]_2,HCl$. It occurs in the form of a white, crystalline powder. The aqueous solution (1 in 50) produces an orange-yellow, crystalline precipitate with potassium dichromate solution, which is soluble in hydrochloric acid, a violet, crystalline precipitate, turning brown on standing, with potassium permanganate solution, and a white, crystalline precipitate with potassium iodide solution. 5 millilitres of an aqueous solution (1 in 50) with 2 drops of dilute hydrochloric acid and 2 drops of a 10 per cent. sodium nitrite solution, mixed with a solution of 0·2 gramme of betanaphthol in 10 millilitres of 10 per cent. sodium hydroxide solution, produces no deep red colour or precipitate (distinction from benzocaine, orthocaine and certain other local anæsthetics). The base separates as a liquid from the aqueous solution on adding a slight excess of ammonia.

Soluble in water (1 in 1) and alcohol (1 in 4).

Standard.—Amydricaine hydrochloride melts at about 169°. Loss on drying at 100°, not more than 2 per cent. Ash, not more than 0·1 per cent.

Action and Uses.—Amydricaine hydrochloride is a local anæsthetic and is used as a substitute for cocaine. Its toxicity equals that of cocaine and is greater than that of most other cocaine substitutes. Applied to the eye it has about one-fourth the anæsthetic effect of cocaine. Its action is rapid, without causing mydriasis, increase of intra-ocular tension, or irritation. Solutions of 2 to 4 per cent. w/v strength are employed. In aural and nasal surgery 5 per cent. w/v solutions are used. Combined with solution of adrenaline, hæmorrhage is lessened and absorption delayed, thus minimising the risk of poisoning. For hypodermic use in dentistry and in minor operations 0·5 to 2 per cent. w/v solutions are employed. It causes hyperæmia by paralysis of the vessel wall and may be extremely irritating. Amydricaine hydrochloride is a useful local anæsthetic to the stomach and is recommended for prophylactic use to prevent post-operative vomiting. Solutions for **injection** may be sterilised

by tyndallisation or by filtration. It is **incompatible** with silver nitrate.

Dose.– 0·003 to 0·03 gramme ($\frac{1}{20}$ to $\frac{1}{2}$ grain).

AMYGDALA AMARA
(Amygdal. Amar.)
Bitter Almond

Bitter almond consists of the dried ripe seeds of *Prunus communis* Arcang. var. *amara* Schneid. (Fam. Rosaceæ), a tree which is cultivated in the countries bordering on the Mediterranean. It is exported chiefly from Morocco and Sicily.

The seeds are broadly ovate and somewhat laterally compressed; they are exalbuminous, about 2 centimetres long and 1·25 centimetres broad. The seed coat is thin, cinnamon-brown and scurfy; the hilum is situated on the edge near the pointed end of the seed. From the chalaza which lies at the rounded, broader end, a number of veins radiate. The embryo is straight and consists of two thick, plano-convex, oily cotyledons, enclosing a small plumule and radicle. The taste is bitter, and a mingled odour of benzaldehyde and hydrocyanic acid is evolved when the seeds are triturated with water.

The diagnostic **microscopical** characters are the lignified, uniformly thickened, giant cells of the seed coat, with pitted radial walls, sub-rectangular in outline in transverse section and usually over 100 microns in diameter; abundant aleurone grains, the larger of which often contain rosette crystals or, occasionally, prisms of calcium oxalate; the presence of much fixed oil.

Bitter almond **contains** fixed oil (about 50 per cent.), the bitter, crystalline glycoside, amygdalin (about 3 to 4 per cent.), and at least two enzymes, emulsin and lactase, together with proteins. It yields about 0·5 to 0·8 per cent. of essential oil, which may contain from 4 to 7 per cent. of hydrocyanic acid.

GROUND BITTER ALMOND contains the elements of the whole seed with the exception of the testa, of which only traces are present. Bitter almond meal is the powdered cake obtained after removal of the fixed oil by expression.

Standard.—Bitter almond contains not more than 2 per cent. of foreign organic matter. Ash, not more than 4 per cent.

Action and Uses.—The action of bitter almond differs from that of the sweet variety owing to the presence of hydrocyanic acid. Unpleasant symptoms may arise, especially in children, from eating relatively small quantities. Lotio Amygdalæ Amaræ forms a suitable basis for soothing skin lotions, especially to allay the smarting of sunburn.

Preparation

Lotio Amygdalæ Amaræ, B.P.C.—(Lot. Amygdal. Amar.)—Lotion of Bitter Almond. *Syn*—Mistura Amygdalæ Amaræ; Bitter Almond Mixture. Bitter almond, 7·5 per cent. w/v, with distilled water.

AMYGDALA DULCIS
(Amygdal. Dulc.)
Sweet Almond

Synonym—Jordan Almonds.

Sweet almond consists of the dried ripe seeds of *Prunus communis* Arcang. var. *dulcis* Schneid. (Fam. Rosaceæ), a tree which is cultivated in all countries bordering on the Mediterranean, but especially in Italy, France, Spain and the Balearic Islands.

The seeds are nearly oblong in outline and somewhat laterally compressed, exalbuminous and about 3 centimetres long and 1·25 centimetres broad. The seed coat is coarsely and longitudinally wrinkled, cinnamon-brown and scurfy. The hilum extends along the edge of the seed from near the pointed end to about half its length; from the chalaza, which lies at the obtuse end, a number of veins radiate. The embryo is of the same shape as the seed, and consists of two white, plano-convex, oily cotyledons enclosing a short radicle and plumule. The taste is bland; on trituration with water an emulsion is formed which is free from any marked odour.

The diagnostic **microscopical** characters are the lignified, giant cells of the seed coat, with pitted radial and inner tangential walls, rectangular in outline, many having arched outer walls usually over 100 microns in diameter; much fixed oil; abundant aleurone grains, the larger of which frequently contain a rosette of calcium oxalate, often with a conspicuous central point.

Sweet almond **contains** fixed oil (45 to 50 per cent.), and about 20 per cent. of proteins including the mixture of enzymes known as emulsin.

GROUND SWEET ALMOND contains the whole elements of the seed with the exception of the seed coats, of which only traces are present. Almond flour or meal is obtained by powdering the cake left after removal of oil by expression; it contains about 8 per cent. of residual oil and about 40 per cent. of protein.

Substitutes.—Valencian, Sicilian, Mogador, Mazagan, Majorcan and Persian are varieties of sweet almonds which are shorter and broader than Jordan almonds; they resemble bitter almonds, but are rather larger and less flattened.

Standard.—Sweet almond contains not more than 1 per cent. of foreign organic matter. Ash, not more than 2 per cent. Prepare a 10 per cent. w/v extract of freshly powdered guaiacum resin in alcohol (95 per cent.); saturate a strip of filter paper of medium texture with the solution and allow to dry slowly; select a number of seeds to be tested, cut each in half to give a smooth surface; saturate the filter paper with a 0·1 per cent. w/v solution of copper sulphate, lay it upon a glass or porcelain plate and quickly place one half of each seed on the sensitised paper to make close contact, allowing them to remain there for ten minutes; no blue stain is produced (absence of bitter almond).

Action and Uses.—Sweet almond is demulcent; a mixture made

from it, such as Mistura Amygdalæ, affords a useful vehicle for cough medicines and in which to suspend terebene and similar drugs not readily miscible with water. Pulvis Amygdalæ Compositus is used as an emulsifying agent and for the preparation of demulcent cough mixtures. Almond flour or meal, being free from starch, is suitable for preparing diabetic foods.

Preparations

Lotio Rosæ, B.P.C.—(Lot. Ros.)—Rose Lotion. *Syn*—Lac Rosæ; Milk of Roses Sweet almond, 1 in 10, with curd soap, white beeswax, almond oil, oils of bergamot, lavender and rose, alcohol (90 per cent.) and rose water.

Mistura Amygdalæ, B.P.C.—(Mist. Amygdal.)—Almond Mixture. Compound powder of almond, 1 in 8, in distilled water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This mixture was included in the British Pharmacopœia, 1914.

Pulvis Amygdalæ Compositus, B.P.C.—(Pulv. Amygdal. Co.)—Compound Powder of Almond. Sweet almond, 60 per cent., with sucrose and acacia.

This powder was included in the British Pharmacopœia, 1914.

AMYLENI HYDRAS

(Amylen. Hydr.)

Amylene Hydrate

$C_5H_{12}O = 88{\cdot}09$

Synonyms—Amylene Hydratum; Tertiary Amyl Alcohol.

Amylene hydrate is dimethylethylcarbinol, $(CH_3)_2C_2H_5C{\cdot}OH$, and may be prepared by treating trimethylethylene (amylene) with sulphuric acid, and subsequently distilling the amylene sulphate with an alkali. It occurs as a clear, volatile liquid with a penetrating odour, resembling that of camphor and peppermint, and has a pungent taste. On cooling to a low temperature it solidifies in acicular crystals, which are hygroscopic. Oxidation with chromic acid converts it into acetic acid and acetone.

Soluble in water (1 in 8), and in all proportions of alcohol, ether, chloroform and glycerin.

Standard.—Amylene hydrate boils between 97° and 103°. Specific gravity, 0·812 to 0·815. On treating 20 millilitres of an aqueous solution (1 in 20) with 2 drops of potassium permanganate solution, decolourisation is not complete within ten minutes (limit of amyl alcohol). Another portion of the solution does not reduce an ammoniacal solution of silver nitrate within ten minutes when heated on a water-bath (absence of aldehyde). On shaking 8 millilitres with 0·6 gramme of anhydrous copper sulphate, no pronounced blue colour is produced (absence of water).

Action and Uses.—Amylene hydrate is a safe hypnotic resembling

paraldehyde in its action, but it is two or three times as powerful and depresses the heart more. It shares the disadvantage of frequently causing stimulation of the central nervous system; marked excitement may therefore precede hypnosis, and on this account amylene hydrate is among the lesser used hypnotics. It is not so powerful as chloral hydrate, but is less depressing to the heart. Amylene hydrate produces a marked fall in the temperature. Like paraldehyde, it is excreted mainly by the lungs. It may be **administered** in capsules, or in a mixture, suitably flavoured.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

AMYLIS ACETAS
(Amyl. Acet.)

Amyl Acetate

$C_7H_{14}O_2 = 130{\cdot}1$

Amyl acetate, $CH_3{\cdot}COOC_5H_{11}$, may be prepared by the action of glacial acetic acid on amyl alcohol boiling between 128° and 132°, in the presence of a small quantity of sulphuric acid. The ethereal layer is separated, well washed with water, again separated, and rectified by distillation. It is a mixture of isomeric acetates and occurs as a colourless, mobile, neutral and inflammable liquid, having a powerful pear-like odour. After long keeping the liquid becomes acid in reaction; this, however, does not interfere with its employment as a fruit essence, but, if necessary, it may be treated with sodium bicarbonate and redistilled.

Very slightly **soluble** in water; soluble in all proportions of alcohol, ether, ethyl acetate and amyl alcohol.

Standard.—Not less than 90 per cent. distils between 135° and 145°. Specific gravity, 0·870 to 0·876.

Action and Uses.—Amyl acetate is not employed therapeutically. A compound alcoholic solution, known in commerce as essence of jargonelle pear, is used as a flavouring agent. Amyl acetate is a solvent for celluloid, resins and pyroxylin, and is used with other solvents in the preparation of lacquers, varnishes and collodions, and liquid plasters.

AMYLIS NITRIS
(Amyl. Nitris)

Amyl Nitrite

$C_5H_{11}O_2N = 117{\cdot}1$

Amyl nitrite is a mixture consisting chiefly of nitrites of

methyl-3-butanol-1, $(CH_3)_2CH \cdot CH_2 \cdot CH_2OH$, and methyl-2-butanol-1, $C_2H_5 \cdot CH(CH_3)CH_2OH$, with other nitrites of the homologous series. It may be prepared by acting on amyl alcohol or fusel oil, distilled between 128° and 132°, with sodium nitrite and sulphuric acid. It occurs as a clear, yellow liquid with a fragrant odour, and an aromatic pungent taste. It is inflammable and very volatile. Amyl nitrite should be **stored** in well-closed containers in a cool, dark place.

Insoluble in water; miscible with alcohol and ether.

Standard, B.P.—Amyl nitrite contains not less than 90 per cent. w/w of nitrites, calculated as $C_5H_{11}O_2N$. Specific gravity, 0·874 to 0·884. Not less than 85 per cent. distils between 90° and 100°. Residue on evaporation, not more than 0·01 per cent. w/v. It complies also with limit tests for acid and aldehyde.

Action and Uses.—Amyl nitrite when inhaled depresses all plain muscle throughout the body, its effects being most pronounced on the circulatory system. The arterioles dilate and the blood pressure falls very considerably. Owing to this action it flushes the face and causes the head and neck to perspire. It is rapidly absorbed by the great area of lung capillaries, so that the onset of its action is almost immediate, but the effect usually lasts for two or three minutes only.

The chief use of amyl nitrite is in the treatment of an attack of angina pectoris associated with high blood pressure, when it affords relief by the dilatation of the coronary vessels. It is contra-indicated in coronary thrombosis, and it should not be used, therefore, indiscriminately in attacks of angina pectoris associated with dyspnœa. It has been used in asthma and sea-sickness, to relieve the spasm of croup and whooping cough, and in the treatment of raised blood pressure, but in these conditions, by reason of its transient action, it is sometimes replaced by sodium nitrite. If inhaled during the aura of epileptic seizure it will in certain cases abort the attack.

Amyl nitrite is usually **administered** by inhalation, but in cases where inhalation cannot be performed it may be used as a hypodermic injection. For inhalation it is supplied in small glass capsules containing from 0·12 to 0·3 millilitre (2 to 5 minims), covered with cotton wool and silk. The glass should be broken by pressure, the vapour being cautiously and not too suddenly inhaled; as much as 0·6 millilitre (10 minims) is sometimes used. In handling amyl nitrite, inhalation of the vapour should be avoided. In cases of **poisoning** from oral administration, an emetic of mustard or zinc sulphate should be given, followed by injection of adrenaline or ephedrine. The recumbent position should be maintained and oxygen, either alone or with 5 per cent. of carbon dioxide, should be given, or artificial respiration applied if necessary. In cases of poisoning from inhalation the emetic should be omitted.

Dose.—0·12 to 0·3 millilitre (2 to 5 minims), by inhalation.

AMYLOCAINÆ HYDROCHLORIDUM

(Amylocain. Hydrochlor.)

Amylocaine Hydrochloride

$C_{14}H_{21}O_2N,HCl = 271{\cdot}6$

Amylocaine hydrochloride is the hydrochloride of the benzoyl ester of methylethyldimethylaminomethylcarbinol, $C_6H_5COOC(CH_3)(C_2H_5)(CH_2N(CH_3)_2)$, which may be prepared from dimethylamino-acetone by the action of magnesium ethylbromide. It occurs as a white, crystalline, odourless powder with a bitter taste, causing temporary anæsthesia of the tongue. The aqueous solution is neutral to congo-red, but faintly acid to litmus, and gives the reactions of chlorides. The base is precipitated as a non-crystallisable oil on adding solution of sodium carbonate or sodium hydroxide to the aqueous solution, and can be extracted with light petroleum. Amylocaine hydrochloride slowly decolourises potassium permanganate solution, but, unlike cocaine, no crystalline precipitate is produced. It may be distinguished from orthocaine by the formation of a precipitate on the addition of iodine solution or solution of potassio-mercuric iodide. The latter reaction also distinguishes it from benzocaine. It should be **stored** in a dark place.

Soluble in water (1 in 2) and dehydrated alcohol (1 in 3); almost insoluble in ether.

Standard, B.P.—Amylocaine hydrochloride has a melting-point of 177° to 179°. Ash, not more than 0·1 per cent. It complies also with a test for the absence of readily carbonisable substances.

Action and Uses.—Amylocaine hydrochloride is employed as a local anæsthetic. On account of its irritant action it is less useful for this purpose than procaine hydrochloride and, owing to the fact that it dilates the blood vessels, its use with adrenaline is unsatisfactory. Its value when applied to mucous membranes is markedly inferior to that of cocaine. It is rapidly and completely absorbed when given either by the mouth or subcutaneously, and the greater part is destroyed by the liver, practically none being excreted in the urine.

For the production of spinal anæsthesia, amylocaine hydrochloride is less toxic than cocaine. For this purpose the two solutions in common use are (1) amylocaine hydrochloride, 0·1 gramme, sodium chloride, 0·1 gramme, distilled water, 1 millilitre; (2) amylocaine hydrochloride, 0·1 gramme, dextrose, 0·1 gramme, distilled water, 2 millilitres. The dosage for intraspinal use is from 0 02 to 0 06 gramme and it may be combined with either strychnine hydrochloride, 0 001 to 0·002 gramme, or caffeine, 0·1 gramme, and sodium benzoate, 0·1 gramme. Strychnine and caffeine, when added, are for the purpose of combating the collapse, low blood pressure and respiratory failure that may occur. Given in the above doses amylocaine hydrochloride produces complete paralysis of the posterior nerve roots, but does not paralyse the anterior motor roots. The anæsthesia appears in a

few minutes and lasts from forty minutes to two hours. For local infiltration anæsthesia, 0·5 to 2 per cent. w/v solutions are employed, and for ophthalmic instillation, solutions of 2 to 4 per cent. w/v are used. A solution for **injection** may be sterilised by tyndallisation or by filtration, and the containers should comply with the tests for limit of alkalinity of glass.

Dose.– 0 02 to 0·05 gramme ($\frac{1}{3}$ to $\frac{3}{4}$ grain), by mouth or by subcutaneous injection; 0 02 to 0·1 gramme ($\frac{1}{3}$ to $1\frac{1}{2}$ grains), by inthrathecal injection.

Preparation

Unguentum Adrenalinæ et Amylocainæ Compositum, B.P.C.—(Ung. Adrenal. et Amylocain. Co) Compound Ointment of Adrenaline and Amylocaine Adrenaline, 1 in 14,000, as benzoate, amylocaine hydrochloride and benzocaine, of each 1 per cent., and liquid extract of hamamelis, 7·5 per cent. v/w, in wool fat and yellow soft paraffin.

AMYLUM

(Amylum)

Starch

Synonyms—Maize Starch; Corn Starch.

Starch is prepared from the grains of maize, *Zea Mays* Linn. (Fam. Gramineæ). It is manufactured chiefly in the United States of America, which produces about nine-tenths of the world's supply; comparatively small quantities are produced in Germany, Canada and Great Britain.

It occurs as a fine, white, odourless and tasteless powder, or in irregular angular masses, known as "crystal" starch, which are readily powdered. Examined **microscopically,** the granules are seen to be polyhedral, sub-spherical or, occasionally, muller-shaped; they are from about 10 to 20 or up to 25 microns in diameter. The hilum is represented by a central, triangular, or 2 to 5-rayed fissure, and striations are not visible. It shows a well-marked cross by polarised light. Starch is insoluble in cold water, in alcohol and in other organic solvents; when 1 gramme is boiled with 15 millilitres of water and the mixture cooled, a translucent, whitish, gelatinous mass is formed. Mucilage of starch, prepared by boiling starch with a large volume of water, gives, on the addition of a few drops of solution of iodine, a deep blue colour, which disappears on warming and reappears on cooling.

Starch **contains** the polysaccharide, amylose, and also amylopectin and amylo-hemicellulose.

Standard, B.P.—Starch loses on drying at 100° not more than 14 per cent. of its weight. Ash, not more than 0·5 per cent.

Action and Uses.—Starch soaks up secretions and helps to render injured parts less liable to bacterial infection. As a dusting powder

for application to chafings and excoriations, it is used either alone or mixed with zinc oxide, boric acid or other similar substances. Boiled with water it may be employed as an emollient for the skin. As a protective application in skin diseases it may be used in the form of Glycerinum Amyli. Mucilage of starch is the basis for many enemata and is an antidote for poisoning by iodine; it should be freshly prepared as required. Boiled with sufficient water to form a stiff paste, starch forms an excellent poultice, which may be improved by the addition of 6 per cent. of boric acid.

AMYLUM ORYZÆ.—Rice starch is prepared from grains of rice, *Oryza sativa* Linn. (Fam. Gramineæ). The granules occur singly and in compound grains. Single granules are polyhedral and are usually from 5 to 8 or up to 12 microns in diameter; the hilum is sometimes evident as a minute central point; spindle-shaped and lemon-shaped granules are absent (distinction from oat starch). The compound grains are ovate, usually from about 12 to 30 microns long and 7 to 20 microns wide; they contain from about 2 to 150 components. The constituents are similar to those of maize starch.

AMYLUM TRITICI.—Wheat starch is manufactured from grains of wheat, *Triticum æstivum* Lam. (Fam. Gramineæ). The granules are lenticular and, in outline, are circular, oval or sub-reniform; the hilum appears as a central point or, if the granule is on its edge, as a line. The granules are mostly simple, the smaller ones being usually from 5 to 10 microns and the larger ones from 20 to 25 or up to 50 microns in greatest width. A few compound granules of 2 to 4 components are present; there are always more than 400 granules per milligram having a maximum diameter exceeding 40 microns (distinction from barley starch). When viewed in polarised light, a dull cross of the maltese shape is seen. The constituents of wheat starch are similar to those of maize starch.

AMYLUM SOLANI.—Potato starch is manufactured from the tubers of the potato, *Solanum tuberosum* Linn. (Fam. Solanaceæ). The granules are ovoid, irregularly ovoid, or sub-spherical, and often somewhat flattened; the hilum is a point towards the narrower end of the granule, and has an eccentricity of $\frac{1}{3}$ to $\frac{1}{4}$; the striations are well-marked and concentric; some rings appear darker than others. The granules are mostly simple, the sub-spherical ones measuring from about 10 to 35 microns and the ovoid ones from 30 to 100 microns. A few compound granules of from 2 to 3 components are always present. The granules show a well-marked cross when examined in polarised light; they contain not more than 20 per cent. of moisture, and the remainder of the granule consists of 66 per cent. of polymerised amylose and 33 per cent. of amylopectin.

AMYLUM SOLUBILE.—Soluble starch is prepared from the starch of the potato, *Solanum tuberosum* Linn. (Fam. Solanaceæ), by a process of treatment with dilute hydrochloric acid, carefully adjusted so as to destroy the gelatinising power of the starch. Soluble starch shows the microscopical appearance almost unchanged of potato starch, but has acquired the property of being readily soluble in hot water to form a transparent, mobile liquid. A 2 per cent. solution, prepared by mixing 1 part with 5 parts of cold water, diluting to 50 parts with boiling water and heating to 100° for two minutes, gives an incomplete reduction when 10 millilitres is boiled with 0·1 millilitre of Fehling's solution, and gives a deep blue colour when one drop of solution of iodine is added to 10 millilitres. The reagent of the British Pharmacopœia loses at 100° not more than 15 per cent. of its weight, and complies with the limit test for chlorides.

Preparations

Glycerinum Amyli, B.P.—(Glycer. Amyli)—Glycerin of Starch. *Syn.*—Glycerite of Starch. Starch, 8·5 per cent., heated in glycerin and water until gelatinised. It should be stored in well-closed containers.

Pulvis Zinci et Amyli, B.P.C.—(Pulv. Zinc. et Amyli)—Zinc and Starch Powder. Equal parts of zinc oxide and starch.

Pulvis Zinci et Amyli Compositus, B.P.C.—(Pulv. Zinc. et Amyli Co.)—Compound Zinc and Starch Powder. Equal parts of zinc oxide, starch, boric acid and purified talc, perfumed with oil of geranium.

ANCHUSA

(Anchus.)

Alkanna

Synonyms—Alkanet Root; Dyer's Alkanet.

Alkanna is the dried root of *Alkanna tinctoria* Tausch. (Fam. Boraginaceæ), a deciduous herbaceous plant with a perennial rootstock, growing in sandy soil in Southern Europe, Hungary and Asiatic Turkey, the chief supplies coming from Hungary.

The tapering roots are simple, deep reddish-purple in colour, varying from about 10 to 15 centimetres in length and from 1 to 2 centimetres in thickness near the crown, to which are attached the remains of leaves, bearing whitish, bristly hairs. The roots have little odour or taste and readily colour the fingers when handled. The external surface is deeply furrowed and the outer layers readily exfoliate in papery strips; the furrows are often so deep as to separate the whitish wood into isolated strands, these changes being due to the formation of red colouring matter and ultimate destruction of the parenchymatous tissue.

Alkanna **contains** two substances of an acid nature, namely, anchusic and alkannic acids, one of which is readily soluble in oils and fats and is changed from red to blue by alkalis. By extraction with light petroleum it yields about 3 per cent. of a red, amorphous substance known as alkannin, $C_{16}H_{14}O_4$, which gives a blue colour with alkalis.

Substitutes.—The root of *Lawsonia alba* Lam. is sometimes known as "true" alkanet root. Many other roots contain a somewhat similar red colouring matter, e.g. the roots of *Onosma echioides* Linn. and of *Macrotomia Cephalotes* Boiss., the latter, known as Syrian alkanet, yields to alcohol about 9 per cent. of coloured extractive; it is frequently found in commerce and is a valuable colouring agent.

Standard.—Alkanna contains not more than 2 per cent. of foreign organic matter. Acid-insoluble ash, not more than 10 per cent.

Action and Uses.—Alkanna is used for colouring toilet preparations of an oily or spirituous nature. "Red oil" may be prepared by digesting 1 part of alkanna in 7 parts of liquid paraffin. The red colouring matter in alcoholic solution is used as a microscopical reagent for the detection of oils and fatty matter.

ANETHOLUM
(Anethol.)
Anethole

$C_{10}H_{12}O = 148{\cdot}1$

Anethole, or *p*-methoxypropenylbenzene, $C_6H_4(OCH_3)C_3H_5$, may be obtained from oil of anise. It occurs as a white, crystalline mass having an odour of anise and an intensely sweet taste. When melted it is a strongly refractive, colourless liquid. Evaporated on a water-bath it leaves nearly 10 per cent. of a non-volatile, odourless polymer. The action of air and light induces changes in anethole, causing it to become yellow, to acquire the odour of anisic aldehyde and a bitter, unpleasant taste, and lowers the congealing-point until finally it ceases to crystallise. It boils at about 234°. It should be **stored** in well-stoppered, amber-coloured bottles, protected from light and air.

Slightly **soluble** in water; readily soluble in ether and chloroform, and forms a clear solution with two volumes of alcohol.

Standard.—Anethole congeals or freezes between 21° and 22°. Re-melting-point, 22° to 23°. Specific gravity at 25°, 0·984 to 0·986. Refractive index at 25°, 1·558 to 1·561.

Action and Uses.—Anethole has the action of essential oils generally, and may be used as a carminative and expectorant.

Dose.—0·03 to 0·18 millilitre (½ to 3 minims).

ANETHUM
(Aneth.)
Dill

Synonyms—Anethi Fructus; Dill Fruit.

Dill consists of the dried ripe fruits of *Anethum graveolens* Linn. (Fam. Umbelliferæ), an annual herb cultivated in Germany and also, to a smaller extent, in England.

The cremocarps are broadly oval and glabrous, about 3 to 4 millimetres long, 2 to 3 millimetres broad and 1 millimetre thick, being so strongly compressed dorsally as to appear almost flat. They are chocolate-brown in colour and each mericarp has three inconspicuous pale brown, dorsal ridges, the two lateral ridges being yellowish and prolonged to form membranous wings. The flat commissural surface shows the carpophore as a pale line down the centre. A transverse section through a mericarp shows usually six vittæ, four being dorsal and two commissural, and five vascular strands, three being small and situated dorsally, the two larger strands being in the wings. The drug has a characteristic and pleasantly aromatic odour and taste.

The diagnostic **microscopical** characters of the fruit are the striated cuticle of the outer epidermis; the small amount of the lignified reticulate parenchyma of the mesocarp; the inner epidermis, composed of tabular cells frequently with wavy walls; the thick-walled parenchyma of the endosperm, containing fixed oil, aleurone grains and microsphæroidal crystals of calcium oxalate.

Dill **contains** about 3 to 4 per cent. of volatile oil, together with fixed oil and mucilage.

Substitute.—Considerable quantities of Indian dill, *Anethum Sowa* Roxb., are imported from Bombay. These fruits are distinguished by being narrower and more strongly convex, as well as by the paler colour of the dorsal ridges, which renders them much more conspicuous than those of the official fruit. Moreover, the mericarps are usually united and attached to a small pedicel.

Standard, B.P.—Dill contains not more than 2 per cent. of foreign organic matter. Ash, not more than 11 per cent.

Dill, in powder (Pulvis Anethi : Pulv. Aneth.), contains the constituents and possesses the diagnostic microscopical characters of Anethum, and complies with the limit for ash of the unground drug.

Action and Uses.—The action of dill depends on the essential oil which it contains (see Oleum Anethi). It is used in mixtures in the form of Aqua Anethi which is a common domestic remedy for the flatulence of infants and is a useful vehicle for children's medicines generally.

Preparations

Aqua Anethi Concentrata, B.P.—(Aq. Aneth. Conc.)—Concentrated Dill Water. Oil of dill, 1 in 50. One part added to 39 parts of distilled water yields a preparation which is approximately equivalent in strength to distilled dill water, but contains 1·5 per cent. v/v of alcohol (90 per cent.). Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This concentrated water, prepared with 6 per cent. v/v of oil of dill, was included in the British Pharmaceutical Codex, 1923.

Aqua Anethi Destillata, B.P.—(Aq. Aneth. Dest.)—Distilled Dill Water. Dill, 1 in 10. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

ANGELICÆ FRUCTUS
(Angel. Fruct.)

Angelica Fruit

Synonym—Angelica Seeds.

Angelica fruit consists of the dried, ripe fruits, of *Angelica Archangelica* Hoffm. (Fam. Umbelliferæ), a biennial plant indigenous to Northern Europe and Asia, and cultivated in Italy, France, Germany, and elsewhere.

The fruit is yellowish-white, oval and markedly compressed dorsally, about 7 millimetres long and 5 millimetres wide; the base has a shallow notch, and the apex bears five minute calyx teeth and the remains

of the style; the three dorsal ridges are prominent and bluntly keeled, and the two lateral ones are extended to form membranous margins. The mericarps are usually separated and the brown seed lies loosely in the cavity of the mericarp. The transverse section of the pericarp is divisible into an outer portion which is free from vittæ, and an inner portion containing ten to thirty vittæ in each mericarp. The odour is aromatic, and the taste aromatic and pungent.

Angelica fruit **contains** volatile oil, of which it yields about 1 per cent. (specific gravity, 0·856 to 0·900; specific rotation + 11° to + 16°). The oil varies only very slightly in odour and taste from that of the root or fresh herb. It contains phellandrene and other terpenes, with esters of methylethylacetic (valeric) and hydroxymyristic acids. The ash of the fruit averages about 7 per cent.

Substitutes.—The fruits of other species of *Angelica* are probably used in the production of volatile oil, e.g *A lucida* Linn., and *A sylvestris* Linn., in Italy; *A atropurpurea* Linn., in N. America; *A sylvestris* Linn. and *A. refracta* A Schmidt, in Japan. The oils obtained from the Japanese varieties are very different from that of *A Archangelica*.

Standard.—Angelica fruit contains not more than 3 per cent. of foreign organic matter. Acid-insoluble ash, not more than 1 per cent.

Action and Uses.—The properties of angelica fruit resemble those of angelica root. It is used in the preparation of Tinctura Antiperiodica.

ANGELICÆ RADIX
(Angel. Rad.)

Angelica Root

Angelica root consists of the dried rhizome and roots of *Angelica Archangelica* Hoffm. (Fam. Umbelliferæ), a biennial plant indigenous to Northern Europe and Asia, and cultivated in Italy, France, Germany and elsewhere. It is collected in the autumn, sometimes cut longitudinally into slices, and dried.

The rhizome is vertical, dark brown, nearly cylindrical, from 5 to 10 centimetres in length and from 2 to 4 centimetres in diameter; the upper part bears stem-scars and the brownish, papery remains of leaves; the lower part is surrounded by numerous greyish-brown roots, which are from 20 to 30 centimetres long and from 0·5 to 1·0 centimetre thick in the upper portion, longitudinally furrowed and frequently plaited or twisted together. The fracture is short. The transversely cut surface of the rhizome shows a wide bark containing starch, radially arranged rows of oleo-resin ducts, narrow, porous, radiating wood bundles separated by wide, whitish medullary rays, and a large central pith. The root resembles the rhizome in structure, but has neither pith nor cortex. The odour is strong and aromatic, and the taste aromatic and slightly pungent.

Angelica root **contains** volatile oil (from 0·3 to 1 per cent.), resin (about 6 per cent.), angelic acid and a phytosterol, angelicol. The volatile oil has a specific gravity of 0·857 to 0·918; it contains phellandrene and other terpenes, together with a sesquiterpene and esters of methylethylacetic (valeric) and hydroxypentadecylic acids; the chief odorous constituent is in the portion of higher boiling-point.

Substitute.—The root of wild angelica, *A. sylvestris* Linn., a common British plant, is less branched and much less aromatic than that of *A. Archangelica* Hoffm.

Standard.—Angelica root contains not more than 5 per cent. of its stem-bases and foreign organic matter. Acid-insoluble ash, not more than 4 per cent.

Action and Uses.—Angelica root has stimulant, diaphoretic and expectorant properties, and is administered either in the form of powder, or as an infusion (1 in 20).

Dose.– 0·6 to 2 grammes (10 to 30 grains).

ANILINUM
(Anilin.)

Aniline

$C_6H_7N = 93·06$

Aniline, $C_6H_5NH_2$, may be prepared by the acid reduction of nitrobenzene. It occurs as a colourless or slightly brown, oily liquid, with a characteristic odour, and an aromatic, burning taste. Specific gravity, about 1·027. It solidifies in a freezing mixture, the crystals melting again at about – 8°. Boiling-point, about 183°. With mineral acids it forms crystalline salts which are soluble in water. The addition of a drop of aniline to solution of chlorinated soda causes the formation of an intense violet colour, and the addition of a few drops of potassium dichromate solution to a mixture of aniline and sulphuric acid produces an intense blue colour. Warmed with chloroform and sodium hydroxide solution an intensely poisonous substance, carbylamine or phenyl isocyanide, is formed which has an intolerable odour. Aniline tends to become coloured on keeping and should be **stored** in small, well-stoppered bottles, protected from light.

Soluble in water (1 in 37) and miscible in all proportions with alcohol, ether and oils.

Action and Uses.—Aniline has many derivatives possessing valuable antipyretic and analgesic properties, but has itself no place in therapeutic medicine. Poisoning may be caused by aniline or its vapour, and absorption can occur by the mucous membrane, skin, or lungs. The oxyhæmoglobin of the blood is converted into methæmoglobin and destruction of red blood cells occurs. The clinical manifestations of **poisoning** are cyanosis, anæmia, muscular weakness, a subnormal

temperature and a low blood pressure. Treatment consists in the administration of stimulants and the application of warmth to the extremities. Oxygen and artificial respiration should be employed when necessary.

BENZIDINUM.—Benzidine, $(C_6H_4NH_2)_2$, is a white or slightly reddish, crystalline powder melting at about 128°. It is slightly soluble in boiling water, alcohol and ether. It is used as a reagent for the detection of certain oxidising agents.

m-PHENYLENEDIAMINA.—*m*-Phenylenediamine, $C_6H_4(NH_2)_2$, is used as a reagent for the determination of nitrites in water.

p-PHENYLENEDIAMINA.—*p*-Phenylenediamine, $C_6H_4(NH_2)_2$, and its hydrochloride are used as dyes for hair and fur. Cases of dermatitis have arisen from its use for these purposes.

PHENYLHYDRAZINÆ HYDROCHLORIDUM.—Phenylhydrazine hydrochloride, $C_6H_5NH{\cdot}NH_2{,}HCl$, is the salt of the base obtained from diazobenzene chloride by the action of stannous chloride. It occurs in thin, lustrous plates and is readily soluble in water and alcohol. Owing to its property of destroying red blood cells, phenylhydrazine hydrochloride is used in the treatment of polycythæmia and is administered by the mouth in doses of from 1½ to 5 grains in capsules. Its action is very delayed and, therefore, difficult to control unless the red cell count and hæmoglobin are carefully watched. The red cell count may continue to fall for as long as two weeks after the last dose. As soon as any appreciable effect on the cells and hæmoglobin is noted the treatment should be interrupted until it is known how far the fall is going to continue. A rise in leucocytes is said to precede the fall in red cells. Large or too frequent doses of phenylhydrazine hydrochloride may cause severe anæmia from excessive destruction of red cells, accompanied by marked urobilinuria and jaundice. It is also used as a chemical reagent for the preparation of osazones in the identification of sugars.

ANISUM
(Anis.)
Anise

Synonyms—Aniseed; Anise Fruit.

Anise consists of the dried ripe fruits of *Pimpinella Anisum* Linn. (Fam. Umbelliferæ), an annual plant, indigenous to Greece, Egypt and Asiatic Turkey and cultivated in many countries, particularly in Spain, Southern Russia and Bulgaria.

The fruit is an ovoid, somewhat laterally compressed cremocarp, about 5 millimetres long and 2 millimetres broad. The cremocarps are usually entire, with the slender pedicel attached; they are greenish-grey or brownish in colour and are rough to the touch from the presence of short, stiff hairs; the primary ridges are slender, pale, and uniform in width. A transverse section through the centre of the fruit shows, in the pericarp of each mericarp, about 30 to 50 vittæ on the dorsal surface and usually two large vittæ on the commissure; the commissural surface of the endosperm is not deeply grooved. The taste is sweet and aromatic, and the odour is characteristic.

The diagnostic **microscopical** characters are the numerous unicellular, conical, thick-walled, warty trichomes of the outer epidermis; the

narrow, branching, brown vittæ; the parallel arrangement of the narrow, tangentially elongated cells of the inner epidermis of the pericarp; the small aleurone grains, most of which contain a rosette crystal of calcium oxalate; the fixed oil of the endosperm.

Anise **contains** volatile oil, of which the yield is from 1·5 to 3·5 per cent.; other constituents are fixed oil, choline, sugar and mucilage. Starch and alkaloids are absent.

Varieties.—The Spanish fruits are distinguished by their large size (about 4 millimetres long), the grey or brownish-grey colour, and the tapering shape. Russian fruits are smaller, darker and more ovoid. Anise has been adulterated with fine earth and with other small seeds and fruits, such as henbane seeds and the fruits of *Conium maculatum*, *Setaria glauca* and other weed plants.

Standard.—Anise contains not more than 2 per cent. of other seeds and fruits, and not more than 1 per cent. of foreign organic matter. Acid-insoluble ash, not more than 1·5 per cent.

Anise, in powder (Pulvis Anisi : Pulv. Anis.), contains the constituents and possesses the diagnostic microscopical characters of Anisum, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Anise is a stimulating carminative and a mild expectorant. Its action depends upon the essential oil which it contains and which is generally used in preference to the fruit. Anise is used in the preparation of asthma powders and in veterinary medicines.

Preparations

Aqua Anisi Concentrata, B.P.C.—(Aq. Anis. Conc.)—Concentrated Anise Water. Oil of anise, 1 in 50. One part added to 39 parts of distilled water yields a preparation which is approximately equivalent in strength to distilled anise water, but contains 1·5 per cent. v/v of alcohol (90 per cent.). Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Aqua Anisi Destillata, B.P.C.—(Aq. Anis. Dest.)—Distilled Anise Water. Anise, 1 in 10. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This water was included in the British Pharmacopœia, 1914, under the name of Aqua Anisi.

Syrupus Anisi, B.P.C.—(Syr. Anis.)—Syrup of Anise. Concentrated anise water, 1 in 8, with syrup. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ANISUM STELLATUM

(Anis. Stell.)

Star Anise

Synonyms—Star Anise Fruit; Badiane.

Star anise consists of the ripe fruits of *Illicium verum* Hook. f. (Fam. Magnoliaceæ), a tree indigenous to the Southern and South-western Provinces of China.

The fruits consist of 6 to 11, usually 8, stellately arranged carpels attached to a stout, curved pedicel. The carpels are about 12 millimetres in length, boat-shaped and bluntly-beaked at the apex, but flat

at the base. They are dark brown in colour and wrinkled; the ventral suture is often open, exposing the smooth, shining, hard, reddish-brown seed, with brittle seed coat and large, soft, oily kernel. The odour and taste are spicy and aromatic.

The diagnostic **microscopical** characters are the outer epidermis of the pericarp composed of brown, tabular cells with very thick, outer walls and a strongly striated cuticle; the palisade stone cells, with fairly large lumina, of the inner epidermis of the pericarp, from about 300 to 500 microns long; the palisade outer epidermis of the seed coat; the somewhat stellate, lignified idioblasts, about 220 microns by 145 microns, of the columella and fruit stalk; the inner epidermis of the seed coat with elongated cells, each containing several small calcium oxalate prisms; the aleurone grains, 13 to 17 microns in diameter, seldom containing crystal inclusions.

Star anise **contains** about 5 per cent. of volatile oil, found in the pericarp of the fruit and in the kernel of the seed. The fruits also contain fixed oil, resin, tannic acid and sugar, and the ash averages about 5 per cent.

Substitutes.—Japanese star anise (Shikimi), from *Illicium religiosum* Siebold, is smaller and less regular in appearance. The carpels are more wrinkled, the beak more acute and the pedicels straighter than those of *I. verum*. The fruits differ also in odour, which is balsamic and in taste, which is disagreeably bitter instead of sweet and spicy. They contain the poisonous, crystalline principle, shikimine or sikamin. The volatile oil of *I. religiosum* differs in odour from that of *I. verum*, having a resemblance to that of cajuput, cardamom or sassafras; it contains safrole. The palisade cells of *I. religiosum* never exceed 400 microns in length; the idioblast stone cells, about 100 by 55 microns, are somewhat rounded, and the aleurone grains seldom reach 15 microns in diameter and usually contain from 1 to 3 crystal inclusions.

Action and Uses.—Star anise possesses properties similar to those of anise. It is used principally as a source of Oleum Anisi.

ANTHEMIS
(Anthem.)

Chamomile

Synonyms—Anthemidis Flores; Chamomile Flowers; Roman Chamomile.

Chamomile is the dried, double or semi-double, flowerheads of cultivated varieties of *Anthemis nobilis* Linn. (Fam. Compositæ), a small annual plant indigenous to Britain and cultivated there as well as in Belgium and France. It should be **stored** in a cool, dry place to prevent attack by insects and to preserve the odour.

The dried flowerheads form hemispherical masses about 12 to 20 millimetres in diameter, white or pale buff in colour. The involucre is composed of two or three rows of oblong bracts with membranous margins and is almost entirely hidden by the reflexed outer ligulate

florets. These are pistillate, and the ligulate corolla exhibits four principal veins, three or sometimes two terminal teeth and numerous oil glands. The tubular florets are few in number and are situated towards the centre of the disc; typically, they are hermaphrodite, with a bifid stigma and an inferior ovary; in the double flowerheads, however, they frequently show malformations, such as the presence of three or four stigmas and irregularly enlarged corolla lobes. The ovary of each floret is dotted with oil glands and is devoid of a pappus. The receptacle is conical, solid and covered with numerous paleæ, which are ovate, blunt at the apex and concave, the margins being membranous. The flowers have a strong, characteristic aromatic odour and a bitter taste.

Chamomile **contains** about 0·2 per cent. of a volatile oil and the following constituents have also been isolated:—3:4-dihydroxycinnamic acid, apigenin (a trihydroxyflavone), a *d*-glycoside of apigenin, choline, *i*-inositol, triacontane, taraxasterol, phytosterolin, sugar and a mixture of fatty acids including oleic, linoleic, cerotic, stearic and palmitic. The bitter taste appears to be due to a dark-coloured amorphous material and not to any well-defined constituent; the tinctorial power of the flowers is due to the presence of apigenin.

Substitutes.—Single chamomiles, gathered from wild plants of *Anthemis nobilis*, have only one row of ligulate florets and are collected and sold in Scotland as Scotch chamomiles. The flowerheads of *Matricaria Chamomilla* Linn., the German chamomile, are sometimes supplied as single chamomiles; they may be distinguished by the naked and hollow, conical receptacle and the single row of ligulate florets. They are usually much smaller and darker in colour. Another substitute is feverfew flowers, the flowerheads of *Chrysanthemum Parthenium* Bernh., which have flat and naked receptacles.

Standard.—Chamomile contains not more than 2 per cent. of foreign organic matter. Acid-insoluble ash, not more than 1 per cent.

Action and Uses.—Preparations of chamomile are used internally to improve the appetite and aid digestion. "Chamomile tea" (1 in 20 of boiling water; dose, 1 to 4 fluid ounces) is a domestic remedy for indigestion and may be used as a vehicle for other bitters. The flowers are sometimes employed externally in the form of a poultice. Used as a fomentation, chamomile is a popular remedy in the early stages of inflammation; a decoction of chamomile and bruised poppy capsules is also used as a fomentation for dental abscesses; the decoction is applied inside the mouth and the marc is applied as a poultice. The extract may be combined in pills with purgatives to diminish the tendency to griping. Powdered chamomile is sometimes used as an ingredient of shampoo powders.

Preparations

Decoctum Papaveris et Anthemidis Forte, B.P.C.—(Dec. Papav. et Anthem. Fort.)—Strong Decoction of Poppy and Chamomile. *Syn.*—Decoctum Papaveris et Anthemidis Concentratum. Chamomile and poppy capsule, of each, 1 in 4, with alcohol and distilled water.

Extractum Anthemidis, B.P.C.—(Ext. Anthem.)—Extract of Chamomile. A soft aqueous extract containing added oil of chamomile. Dose.—0·12 to 0·5 gramme (2 to 8 grains).

Extractum Anthemidis Liquidum, B.P.C.—(Ext. Anthem Liq.)—Liquid Extract of Chamomile. 1 in 1. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ANTIMONII ET POTASSII TARTRAS

(Antim. et Pot. Tart.)

Potassium Antimonyltartrate

$C_4H_4O_7SbK,\frac{1}{2}H_2O = 333{\cdot}9$

Synonyms—Antimonium Tartaratum; Tartarated Antimony; Tartar Emetic; Antimony and Potassium Tartrate.

Potassium antimonyltartrate, $K(SbO)C_4H_4O_6,\frac{1}{2}H_2O$, may be prepared by setting aside a mixture of antimonious oxide and potassium acid tartrate, made into a paste with water, until combination has taken place, and then purifying by crystallisation from water. It occurs as colourless, odourless, transparent crystals, or as a white, granular powder. It has a sweet taste and effloresces on exposure to air. A less pure "tartar emetic" is prepared for use in the dyeing industry as a mordant.

Soluble in water (1 in 17), boiling water (1 in 3) and glycerin (1 in 20); insoluble in alcohol.

Standard, B.P.—Potassium antimonyltartrate contains not less than 99 per cent. of $C_4H_4O_7SbK,\frac{1}{2}H_2O$. Arsenic limit, 10 parts per million. Lead limit, 5 parts per million. It complies also with a limit test for alkalinity and acidity.

Action and Uses.—Potassium antimonyltartrate is commonly employed when it is desired to administer antimony. It is not readily dissociated and is therefore not so corrosive as the chloride, but when applied to the skin it produces redness, vesication and pustulation. Its use as a counter-irritant has been discontinued owing to the destructive action on the dermis. When administered by the mouth, it produces nausea and, in most cases, vomiting, followed by perspiration and depression. If vomiting is not produced, the gastric and intestinal mucosa may be damaged. Its use as an emetic has steadily declined. In sub-emetic doses, antimony is a reflex expectorant and is of value in the treatment of bronchitis when the mucus is tenacious.

The main therapeutic use of antimony is in the treatment of certain tropical diseases—leishmaniasis, trypanosomiasis, frambœsia, bilharziasis, and filariasis. Its trypanocidal action is probably less than that of arsenic although it has a similar action and is excreted more rapidly. In the treatment of kala-azar potassium antimonyltartrate has proved strikingly successful, converting a 90 per cent. mortality into a 90 per cent. recovery. Its action in the treatment of bilharzia is to kill both the eggs and the parent worm; it is given intravenously in 2 per cent.

w/v solution in 0·03 gramme (½ grain) doses, rising by 0·03 gramme (½ grain) at each injection to 0·12 gramme (2 grains). This dose is continued until 1·5 to 2 grammes (25 to 30 grains) has been administered. Potassium antimonyltartrate is too irritating to be given subcutaneously and is painful when given intramuscularly. It may be **administered** in aqueous mixtures in the form of Vinum Antimoniale, or in pills massed with lactose and syrup of liquid glucose. A solution for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

In cases of **poisoning** by antimony, persistent vomiting and diarrhœa, followed by muscular weakness and collapse, convulsions, and suppression of urine, occur. Treatment should be designed to remove the poison; the stomach should be washed out, if vomiting has not occurred, and a purge given. Tannic acid, calcium hydroxide and magnesia may be used to precipitate the antimony in the stomach. Stimulants and warmth may be needed.

Dose.– 0·002 to 0·008 gramme (1/32 to ⅛ grain); 0·03 to 0·06 gramme (½ to 1 grain), as an emetic; 0·03 to 0·12 gramme (½ to 2 grains), by intravenous injection.

Preparation

Vinum Antimoniale, B.P.C.—(Vin. Antim.)—Antimonial Wine. Potassium antimonyltartrate, 0·4 per cent. w/v, in sherry-type wine. Dose.– 0·6 to 2 millilitres (10 to 30 minims); emetic dose, 8 to 16 millilitres (2 to 4 fluid drachms).

This wine, prepared with sherry, was included in the British Pharmacopœia, 1914.

ANTIMONII ET SODII TARTRAS

(Antim. et Sod. Tart.)

Sodium Antimonyltartrate

$C_4H_4O_7SbNa = 308·8$

Sodium antimonyltartrate, $Na(SbO)C_4H_4O_6$, may be prepared by setting aside a mixture of antimonious oxide and sodium acid tartrate, made into a paste with water, until combination has taken place, and then purifying by crystallisation from water. It occurs as colourless, odourless, transparent, hygroscopic scales, or as powder, with a sweet taste.

Soluble in water (1 in 1½); insoluble in alcohol.

Standard, B.P.—Sodium antimonyltartrate contains not less than 96 per cent. of $C_4H_4O_7SbNa$, calculated on the substance dried at 100°. Loss on drying at 100°, not more than 5 per cent. Lead limit, 5 parts per million. It complies also with a limit test for alkalinity and acidity.

Action and Uses.—Sodium antimonyltartrate has properties similar to those of potassium antimonyltartrate. It is less toxic and more soluble than the latter and is largely used for the treatment of bilharziasis, kala-azar, etc. It is usually **administered** intravenously, beginning with a dose of $\frac{1}{2}$ grain and increasing to 2 grains, three times a week. A solution for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·002 to 0·008 gramme ($\frac{1}{3\frac{1}{2}}$ to $\frac{1}{8}$ grain); 0·03 to 0·06 gramme ($\frac{1}{2}$ to 1 grain), as an emetic. 0·03 to 0·12 gramme ($\frac{1}{2}$ to 2 grains), by intravenous injection.

ANTIMONII OXIDUM

(Antim. Oxid.)

Antimonious Oxide

$Sb_2O_3 = 291·5$

Synonym—Antimony Trioxide.

Antimonious oxide may be obtained by pouring a solution of antimonious chloride into water, and decomposing the precipitated antimony oxychloride with sodium carbonate. It occurs as a greyish-white powder, fusible at a low red heat.

Insoluble in water; soluble in hydrochloric acid.

Standard.—Antimonious oxide contains not less than 99 per cent. of Sb_2O_3. Arsenic limit, 1000 parts per million. Lead limit, 1500 parts per million. It dissolves completely when boiled with an excess of potassium acid tartrate solution.

Assay.—Dissolve about 0·25 gramme, accurately weighed, in dilute hydrochloric acid, add 5 grammes of sodium potassium tartrate and a slight excess of sodium bicarbonate, and titrate with N/10 iodine; each millilitre of N/10 iodine is equivalent to 0·007288 gramme of Sb_2O_3.

Action and Uses.—Antimonious oxide possesses the same therapeutic properties as potassium antimonyltartrate, but in a milder degree because of its comparative insolubility. In large doses it gives rise to violent vomiting, due to its direct irritant action upon the mucous membrane of the stomach. Emesis is followed by depression and even collapse. As an expectorant and diaphoretic it is usually given in small doses, generally as Pulvis Antimonialis. A preparation similar to the latter is James' Fever Powder (Pulvis Jacobi or Pulvis Febrifugus Jacobi), which was originally prepared by calcining a mixture of equal parts of antimony sulphide and hartshorn shavings. Antimony oxide has been used in the treatment of leishmaniasis and trypanosomiasis in the form of an injection, equal parts of glycerin and distilled water being used as solvent. Doses of the injection equivalent to $\frac{1}{100}$ to $\frac{1}{60}$ grain of antimonious oxide are given subcutaneously or intravenously for this purpose.

Dose.– 0·06 to 0·12 gramme (1 to 2 grains).

Preparation

Pulvis Antimonialis, B.P.C.—(Pulv. Antim.)—Antimonial Powder. Antimonious oxide, 1 in 3, with calcium phosphate. Dose.–0·2 to 0·4 gramme (3 to 6 grains).

This powder was included in the British Pharmacopœia, 1914.

ANTIMONIUM SULPHURATUM

(Antim. Sulphur.)

Sulphurated Antimony

Synonym—Crocus Antimony; Kermes Minerale.

Sulphurated antimony may be prepared by the following process.—Dissolve 25 parts of sodium hydroxide in 500 parts of distilled water, add 50 parts of purified black antimony and 50 parts of sublimed sulphur, boil for two hours, stirring frequently and occasionally adding distilled water to replace that lost by evaporation; while the mixture is still hot, add 900 parts of boiling distilled water, strain through calico and gradually add dilute sulphuric acid in slight excess. Finally, collect and wash the precipitate on a calico filter until the filtrate shows no trace of sulphates, and dry the sulphurated antimony at a temperature not exceeding 100°. The product contains antimony sulphides, antimony oxides and free sulphur. It occurs as an amorphous, orange-red powder, without taste or odour.

Insoluble in water; readily and almost completely soluble in sodium hydroxide solution.

Standard.—Sulphurated antimony contains antimony compounds equivalent to not less than 43 per cent. and not more than 50 per cent. of Sb. Arsenic limit, 1000 parts per million.

Assay.—Weigh accurately about 0·25 gramme, add 10 millilitres of hydrochloric acid and a few drops of bromine, and heat until dissolved; to the solution add 10 millilitres of sulphurous acid, warm for a short time and then boil off the excess of sulphur dioxide; titrate with N/10 potassium bromate using methyl orange as indicator; each millilitre of N/10 potassium bromate is equivalent to 0·006088 gramme of Sb.

Action and Uses.—Sulphurated antimony is a diaphoretic and emetic, but owing to the uncertainty of its action it is now rarely prescribed. It is occasionally employed for gout and rheumatism in the form of Pilulæ Hydrargyri Subchloridi Compositæ.

Dose.– 0·06 to 0·12 gramme (1 to 2 grains).

ANTIMONIUM NIGRUM PURIFICATUM.—Purified black antimony, Sb_2S_3, is the natural substance freed from siliceous matter and arsenic by fusion and subsequent digestion of the powdered sulphide with ammonia. It occurs as a nearly black, crystalline powder which is insoluble in water, but almost entirely soluble in hot hydrochloric acid with evolution of hydrogen sulphide.

Preparation

Pilulæ Hydrargyri Subchloridi Compositæ, B.P.C.—(Pil. Hydrarg. Subchlor. Co.)—Compound Mercurous Chloride Pills. *Syn.*—Compound Calomel Pills; Plummer's Pills. Each pill contains 1 grain of mercurous chloride, 1 grain of sulphurated antimony and 2 grains of guaiacum resin. Dose.– 1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914, under the name of Pilula Hydrargyri Subchloridi Composita.

ANTITOXINUM DIPHTHERICUM

(Antitox. Diphtheric.)

Diphtheria Antitoxin

Diphtheria antitoxin consists of the serum of animals, or a preparation of the serum, containing the globulins which have the specific power of neutralising the toxin formed by *Corynebacterium diphtheriæ*. The animals are immunised by the injection of gradually increasing doses of a sterile filtrate from a liquid culture of *C. diphtheriæ*. When a satisfactory degree of immunisation has been effected, a quantity of blood is withdrawn, allowed to clot and the serum collected. It may be used in the liquid form, or may be dried. The antitoxic globulins may be separated from the serum by fractional precipitation and the precipitate may be used in solution or dried. Both liquid forms may contain an antiseptic.

The serum occurs as a yellow or yellowish-brown liquid or, in the solid condition, as a yellowish-white powder, or yellow or yellowish-brown flakes. The solution of the antitoxic globulins is of a yellowish-brown or greenish-yellow colour. Both liquid forms are transparent when first made, but become faintly opalescent when stored; they are almost odourless except for any odour due to an added antiseptic. The solution of the antitoxic globulins does not contain more than 1 gramme of solid matter for each 5000 units and the liquid serum does not contain more than 10 per cent. w/v of solid matter. The dried antitoxic globulins resembles the dried serum in appearance and 10 per cent. w/v solutions of the dried forms resemble the liquid forms. The solid forms do not contain any added antiseptic or other substance.

In whatever form the product is obtained it should be **stored** in sterilised glass containers, sealed so as to exclude bacteria, and kept at as low a temperature above its freezing-point as possible. It deteriorates rapidly during the first few months after it is prepared; the subsequent rate of deterioration, when stored at temperatures not above 10°, is usually about 5 per cent. per annum and does not exceed 10 per cent. When stored at higher temperatures the rate of deterioration is greater and at temperatures from 15° to 20°, it may be up to 20 per cent. per annum. The number of units in each container is sufficient to ensure that the number stated on the label is still present at the end of the period during which the preparation is intended to be used. The

label on the container or the package states the nature of the contents and the date after which it is not intended to be used. This label also states the minimum total number of units in the container and also the number of units in one millilitre or in one gramme, or the total number of millilitres of liquid or grammes of dried product, in the container.

Standard, B.P.—All forms of diphtheria antitoxin comply with the tests for sterility and with tests for freedom from abnormal toxicity prescribed by the regulations made under the Therapeutic Substances Act, 1925. Liquid preparations have a potency of not less than 400 units per millilitre; solid preparations have a potency of not less than 4000 units per gramme.

Action and Uses.—Diphtheria antitoxin neutralises the toxin elaborated by *C. diphtheriæ* locally at the seat of the disease, but does not affect the vitality of the infecting organisms. Pathological changes already induced by the toxin are not affected by antitoxin. The dose of diphtheria antitoxin varies according to the severity and stage of the disease, not with the age of the patient. Local measures of disinfection are also used with the object of destroying streptococci and other organisms, since diphtheria is never a simple infection, and to lessen the danger of infection to others.

For curative purposes at least 8000 units in mild cases treated early, up to 12,000 units in serious cases, or 20,000 units in severe cases treated at a later stage, should be given intramuscularly, or intravenously in case of urgency. If no improvement results in twenty-four hours, the same doses, or larger, should be repeated. A single initial large dose is more effective than when the dose is divided between two injections on successive days. Children require at least as large a dose as adults. Intramuscular injection is preferable to subcutaneous since it secures more rapid absorption. The maximum concentration of antitoxin in the blood is not reached until about three days after subcutaneous injection, but is reached about twenty-four hours after intramuscular injection. Intravenous injection has the advantage that maximum concentration of antitoxin in the blood occurs immediately, and this mode of injection is usually adopted for malignant or severely toxic cases. For such cases, doses ranging from 70,000 to 200,000 units or even more, given partly intravenously and partly intramuscularly, may be necessary to effect a cure. The addition of Liquor Adrenalinæ Hydrochloridi in doses of 0·25 to 0·5 millilitre (4 to 8 minims) to serum injected intravenously is sometimes adopted as a preventive of anaphylaxis or allergic reactions. For prophylactic purposes, 500 to 1000 units may be injected subcutaneously for the temporary immunisation of contacts; such immunity is of short duration and probably does not persist longer than two or three weeks. Subcutaneous injections are usually made in the flank or between the shoulders, intravenous injections into a vein of the hand or arm.

Dose.– Prophylactic, 500 to 1000 units, by injection; therapeutic, 10,000 to 20,000 units, by injection.

ANTITOXINUM SCARLATINUM
(Antitox. Scarlatin.)

Streptococcus Antitoxin (scarlatina)

Synonym—Scarlet Fever Streptococcus Antitoxin.

Streptococcus antitoxin (scarlatina) consists of a solution of the globulins obtained from the serum of horses which have been immunised by the injection of live cultures of *Streptococcus hæmolyticus scarlatinæ* (as in the method originally used by Dochez), or of the toxin from this micro-organism (as in the method used by G. F. and G. H. Dick), or by a modification of these methods. A potent toxin can be prepared as described under Toxinum Scarlatinum. When living streptococci are injected, the specific stimulus is provided by toxin produced *in vivo*. After a satisfactory degree of immunisation has been effected, a quantity of blood is withdrawn from the jugular vein under aseptic conditions and is allowed to clot. The clear serum is decanted and the globulins separated by fractional precipitation. The globulins are purified by dialysis and redissolved in normal saline solution containing 0·5 per cent. of phenol or 0·3 per cent. of cresol as a preservative.

Streptococcus antitoxin (scarlatina) should be **stored** between 5° and 15°. Under these conditions it will retain its potency for several years. It should be issued in sterilised containers sealed so as to exclude bacteria. If the containers permit the withdrawal of less than the entire contents, the antitoxin should contain a preservative at least as effective as 0·5 per cent. of phenol. The label of the container should indicate the date after which the antitoxin is not intended to be used.

Standard.—Streptococcus antitoxin (scarlatina) is a pale, yellowish-grey liquid. It shows not more than a slight opalescence or precipitate and yields not more than 20 per cent. of total solids. It conforms to the tests for sterility and for freedom, from abnormal toxicity prescribed by the regulations made under the Therapeutic Substances Act, 1925. Standardisation of the antitoxin is a matter of considerable difficulty, the available methods being the skin neutralisation, Schultz-Charlton, and passive immunity tests on the human subject, the Parish-Okell test on rabbits and the Wadsworth-Kirkbride test on goats. Although it has been possible by the use of one or other of these to ensure a high antitoxin content, none of the methods has yet met with international acceptance. The Parish-Okell rabbit method (determining the quantity of antitoxin which will neutralise a culture of streptococcus or a dose of toxin given intravenously) and the skin neutralisation test on human subjects (determining the quantity of antitoxin which will neutralise a known amount of toxin in Dick tests) are the methods more generally employed. On the basis of the skin neutralisation test, American workers have established a unit as the smallest amount of antitoxin which is required to neutralise 50 skin-test doses of scarlet

fever toxin. Because of the difficulties of the assay, it is not universally accepted that dosage can be stated usefully in terms of this unit.

Action and Uses.—Streptococcus antitoxin (scarlatina) is used for the diagnosis and treatment of scarlet fever, and for conferring passive immunity on contacts. In the investigation of a case of suspected scarlet fever, when the rash is less than seventy hours old, the Schultz-Charlton or blanching test is often of decisive value in differentiating the rash of scarlet fever from that of other eruptive fevers. The antitoxin may be used undiluted, but usually 0·2 millilitre of a 1 in 10 to 1 in 100 dilution of the antitoxin is injected intradermally when the eruption is marked. If the rash is that of scarlet fever a positive reaction, denoted by a blanching of the skin from 10 to 40 millimetres in diameter, will occur in from four to ten hours and persist for the duration of the eruption. This is due to the specific local effect of the antitoxin on the toxin.

In treatment, the antitoxin should be administered as soon as possible after diagnosis has been made. If given early, it has an immediate and favourable influence on the specific toxæmia of scarlet fever, reducing temperature, malaise and rash, and, according to some clinicians, the incidence of complications. Antitoxin is of little value when adenitis, middle ear disease, etc., have set in. The period of detention in hospital of patients who have received serum early in the disease is usually shortened. Passive immunisation has been found of value in the general wards of childrens' hospitals and in institutions and schools. The contacts are examined by the Dick test, and the positive reactors protected as soon as possible with streptococcus antitoxin (scarlatina).

Some workers believe that all the hæmolytic streptococci of human origin represent one species of bacteria with common pathogenic potentialities, and that hæmolytic streptococci from sources other than scarlet fever produce the same toxin, though to a less degree. Streptococcus antitoxin (scarlatina) has, therefore, been used in the treatment of septicæmia, erysipelas, acute tonsillitis and acute streptococcal infections in general in place of antitoxic sera prepared from the homologous strains. Its use has been recommended also in the prophylactic treatment of wounds received while performing post-mortem examinations or surgical operations on septic cases.

Dose.– Prophylactic, 5 to 10 millilitres to Dick-positive contacts to confer a passive immunity lasting 10 to 14 days; therapeutic, for mild cases, at least 10 millilitres, for severe and toxic cases, 20 to 60 millilitres given as early as possible, and repeated daily in severe cases; intramuscularly in moderate or mild cases.

ANTITOXINUM TETANICUM

(Antitox. Tetanic.)

Tetanus Antitoxin

Tetanus antitoxin consists of the serum of animals, or a preparation of the serum, containing the globulins which have the specific power of

neutralising the toxin formed by *Bacillus Tetani*. The animals are immunised by the injection of gradually increasing doses of a sterile filtrate from a liquid culture of *B. Tetani*. When a satisfactory degree of immunisation has been effected, a quantity of blood is withdrawn, allowed to clot and the serum collected. It may be used in the liquid form, or may be dried. The antitoxic globulins may be separated from the serum by fractional precipitation and the precipitate may be used in solution, or may be dried. Both liquid forms may contain an antiseptic.

The serum occurs as a yellow or yellowish-brown liquid or, in the solid condition, as a yellowish-white powder, or yellow or yellowish-brown flakes. The solution of the antitoxic globulins is of a yellowish-brown or greenish-yellow colour. Both liquid forms are transparent when first made, but become faintly opalescent when stored; they are almost odourless except for any odour due to an added antiseptic. The solution of the antitoxic globulins does not contain more than 1 gramme of solid matter for each 6000 units, and the serum does not contain more than 10 per cent. w/v of solid matter. The dried antitoxic globulins resembles the dried serum in appearance and 10 per cent. w/v solutions of the dried forms resemble the liquid forms. The solid forms do not contain any added antiseptic or other substance.

In whatever form the product is obtained it should be **stored** in sterilised glass containers, sealed so as to exclude bacteria, and kept at as low a temperature above its freezing-point as possible. The number of units in each container must be sufficient to ensure that the number stated on the label is still present at the end of the period during which the preparation is intended to be used. The label on the container or the package states the nature of the contents, whether for prophylactic or therapeutic use, and the date after which the preparation is not intended to be used. The label on the container states the total number of International units in the container and the equivalent number of the units adopted in the United States Pharmacopœia X, which is one half the number of International units. It also states either the number of International units in 1 millilitre or 1 gramme, or the number of millilitres of liquid or grammes of solid in the container.

Standard, B.P.—All forms of tetanus antitoxin comply with the tests for sterility and with the tests for abnormal toxicity prescribed by the regulations made under the Therapeutic Substances Act, 1925. For prophylactic use, liquid preparations have a potency of not less than 300 units per millilitre and solid preparations of not less than 3000 units per gramme. For therapeutic use, liquid preparations have a potency of not less than 1600 units per millilitre and solid preparations of not less than 16,000 units per gramme.

Action and Uses.—Tetanus antitoxin is truly antitoxic, that is, it neutralises the toxin of the tetanus bacillus, rendering it inert. Its neutralising power is most marked *in vitro;* as a curative agent in acute tetanus its action is somewhat disappointing, owing to the fact that the

tetanus poison has so extraordinary an affinity for nerve cells that a considerable concentration of antitoxin is required subsequently to overcome it. Also it is not until the action of the toxin upon nerve tissue is exerted that symptoms of tetanus arise; as in the case of diphtheria, the antitoxin can destroy the toxin, but will not influence pathological tissue changes already produced.

The early treatment of tetanus being of supreme importance, the antitoxin is of greatest use as a prophylactic. It does not immunise for more than three weeks and, since the incubation period of tetanus may be as long as one month, 1000 units should be injected immediately after all wounds, when there is any likelihood of tetanus ensuing, 1000 units a fortnight afterwards, and a third injection in another fortnight. Sometimes a mixture of tetanus antitoxin and gas-gangrene antitoxin (perfringens) is employed prophylactically after wounds which may have been infected by both organisms. Dried tetanus antitoxin has been recommended as a dressing for wounds, as well as for preparing a solution for injection. For curative effect, the antitoxin should be injected as soon as the diagnosis is probable; 20,000 units should be given, partly intraspinally and partly intravenously, the part doses being repeated on two successive days if necessary. The intravenous dose should be repeated at least once in the next forty-eight hours and the intraspinal injection should be repeated daily at first, and at longer intervals as the patient improves.

Dose.– Prophylactic, 1000 to 2000 units, by injection; therapeutic, 20,000 to 40,000 units, by injection.

ANTITOXINUM WELCHICUM

(Antitox. Welchic.)

Gas-gangrene Antitoxin (perfringens)

Gas-gangrene antitoxin (perfringens) consists of the serum of animals, or a preparation of the serum, containing the globulins which have the specific power of neutralising the toxin formed by *Bacillus perfringens* (*B. Welchii*). The animals are immunised by the injection of gradually increasing doses of a sterile filtrate from a liquid culture of *B. perfringens* (*B. Welchii*). When a satisfactory degree of immunisation has been effected, a quantity of blood is withdrawn, allowed to clot, and the serum collected. It may be used in the liquid form, or may be dried. The antitoxic globulins may be separated from the serum by fractional precipitation and the precipitate may be used in solution, or may be dried. Both liquid forms may contain an antiseptic.

The serum occurs as a yellow or yellowish-brown liquid or, in the solid condition, as a yellowish-white powder, or yellowish-brown flakes.

The solution of the antitoxic globulins is of a yellowish-brown or greenish-yellow colour. Both liquid forms are transparent when first made, but become faintly opalescent when stored; they are almost odourless except for any odour due to an added antiseptic. The solution of the antitoxic globulins does not contain more than 20 per cent. w/v of solid matter and the liquid serum does not contain more than 10 per cent. w/v of solid matter. The dried antitoxic globulins resembles the dried serum in appearance, and 10 per cent. w/v solutions of the dried forms resemble the liquid forms. The solid forms do not contain any added antiseptic or other substance.

In whatever form the product is obtained it should be **stored** in sterilised glass containers sealed so as to exclude bacteria, and kept at as low a temperature above its freezing-point as possible. The label on the container or the package states the nature of the contents and the date after which it is not intended to be used. The label on the container states the minimum total number of units in the container, also the number of units in one millilitre or in one gramme, or the total number of millilitres of a liquid or grammes of dried product in the container. The number of units placed in each container must be sufficient to ensure that the number stated on the label is still present at the end of the period during which the preparation is intended to be used.

Standard, B.P.—All forms of gas-gangrene antitoxin (perfringens) comply with the tests for sterility and with tests for freedom from abnormal toxicity prescribed by the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Gas-gangrene antitoxin is used in cases of acute intestinal obstruction and of peritonitis with paralytic ileus. It is also used as a prophylactic measure against the development of gas-gangrene after injury. The therapeutic dose is from 10,000 to 20,000 units, given intravenously, followed by daily intramuscular injections of 4000 to 10,000 units. Prophylactic injections of 4000 units are given before operation in cases of acute obstruction. From 500 to 1000 units appear sufficient when given prophylactically immediately after injury. This dose may be given with tetanus antitoxin and preferably with the other gas-gangrene antitoxins.

Dose.– Prophylactic, 4000 units, by injection; therapeutic, 10,000 to 20,000 units, by intravenous injection.

OTHER GAS-GANGRENE ANTITOXINS.—Gas-gangrene may be caused by organisms other than *B. perfringens*, and sera are prepared by immunising horses against the toxins produced by *B. œdematis maligni* (*Vibrion septique*) and *B. novyi* (*B. œdematiens*). The toxins are produced by a method similar to that employed in the production of *B. perfringens* toxin. *V. septique* antitoxin is tested by intravenous injection, and *B. œdematiens* antitoxin by intramuscular injection into mice, or both antitoxins by intracutaneous injection into guinea-pigs. There is no official unit for these antitoxins, their potency being recorded in terms of provisional units representing the neutralising power of an arbitrarily chosen volume of a selected serum.

APIOL
(Apiol)
Apiol

Apiol is prepared by extracting the dried fruit of parsley, *Carum Petroselinum* Benth. et Hook. (Fam. Umbelliferæ), with alcohol, distilling off the solvent, cooling to permit the deposition of amorphous solid residue, apiin, from which the apiol is then decanted. It is a green, oily liquid having a peculiar odour and a disagreeable, acrid taste. Its specific gravity is from 1·055 to 1·091.

Insoluble in water.

Action and Uses.—Apiol is used chiefly in dysmenorrhœa and amenorrhœa, and also as a diuretic. In large doses apiol sometimes produces effects similar to those of cinchonism, such as ringing in the ears, headache and vertigo. It is usually **administered** in capsules.

Dose.– 0·2 to 0·6 millilitre (3 to 10 minims).

"GREEN APIOL" is a commercial liquid apiol, prepared by extracting dried parsley fruit with ether, distilling off most of the solvent at a low temperature, and removing final traces by exposure to warm air. It is a light green liquid, having an odour of parsley, and is distinguished from apiol by its lower specific gravity of about 0·93.

YELLOW LIQUID APIOL is a thick, oily liquid, yellowish-brown in colour. It is prepared by purifying "green apiol."

APIOLE, OR CRYSTALLINE APIOL, $C_{12}H_{14}O_4$, occurs in the form of white acicular crystals, having a persistent parsley odour and a burning taste. It is slightly soluble in water, freely soluble in chloroform, ether and alcohol, from which it can be easily crystallised. It dissolves in sulphuric acid with a characteristic blood-red colour. Melting-point, 29° to 30°. It combines with bromine to form tribromo-apiole, melting-point, 110°.

DILL-APIOLE, $C_{12}H_{14}O_4$, is an oily, non-crystallisable liquid obtained from volatile oil of Indian dill fruit, *Anethum Sowa* Roxb. It is isomeric with apiole. Its specific gravity is about 1·15 and it has poisonous properties.

APIUM
(Apium)
Celery

Synonyms—Apii Fructus; Celery Fruit; Celery Seed.

Celery consists of the dried, ripe fruits of cultivated plants of *Apium graveolens* Linn. (Fam. Umbelliferæ), a biennial herb indigenous to Southern European countries, and found also in India and the United States of America. The plant grows wild in marshy places, especially near the sea, and has a rank odour and disagreeable taste, which have disappeared from the cultivated variety.

The fruit is a cremocarp, 1·0 to 1·5 millimetres long, about 1·5 millimetres wide and 0·5 millimetre thick, sub-spherical and laterally compressed, having two small stylopods and an occasional, slender, straight pedicel. The mericarps are mostly separate, somewhat crescent-shaped, glabrous, dark brown, with five paler brown, straight ridges and the commissural surface nearly flat. A transverse section through the centre of a mericarp is almost pentagonal; it shows a brown pericarp in which are 6 to 9 oval vittæ, 2 within the commissural surface and usually 1, sometimes 2 or 3, in each groove of the dorsal surface; the endosperm is dense and oily, and a minute embryo occurs near the apex. The odour is aromatic and characteristic, and the taste aromatic and slightly camphoraceous.

The diagnostic **microscopical** characters of the fruit are the polygonal epidermal cells, with slightly wavy side walls and the outer walls radiately striated and frequently papillose; the conspicuous endocarp tissue of narrow, brown, thin-walled, lignified, tangentially arranged cells; the brown vittæ, with a secretory epithelium and transverse walls at intervals; the large proportion of endosperm tissue composed of thick-walled polygonal cells containing fixed oil and aleurone grains, each of which encloses a rosette crystal of calcium oxalate.

Celery **contains** volatile oil of which it yields from 2 to 3 per cent. The oil possesses the characteristic odour of the drug and consists mainly of terpenes, but its odour is due to a ketoacid, sedanonic acid, present as an anhydride, and a hydroxyacid, sedanolic acid, which is present as its lactone, sedanolid; pinene is absent. The oil also contains palmitic acid and two phenols, one of which is guaiacol. Starch and alkaloids are absent. The ash averages about 10 per cent.

Standard.—Celery contains not more than 4 per cent. of other seeds and fruits, and not more than 1 per cent. of other foreign organic matter. Acid-insoluble ash, not more than 2 per cent.

Celery, in powder (Pulvis Apii : Pulv. Apii), contains the constituents and possesses the diagnostic microscopical characters of Apium, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Celery is reported to have a sedative and tonic effect upon the nervous system, and, as a decoction, is a popular domestic remedy for the treatment of rheumatism. It is doubtful, however, whether it has any real therapeutic value. The oil is sometimes prescribed as an antispasmodic and nerve stimulant in doses of ½ to 3 minims and in rheumatoid arthritis in doses of 5 to 15 minims.

Dose.– 1·2 to 4 grammes (20 to 60 grains).

Preparation

Extractum Apii Liquidum, B.P.C.—(Ext. Apii Liq.)—Liquid Extract of Celery. 1 in 1. Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

APOCYNUM

(Apocyn.)

Apocynum

Synonym—Canadian Hemp.

Apocynum consists of the rhizome and root of *Apocynum cannabinum* Linn. (Fam. Apocynaceæ), and of other species of *Apocynum*, herbaceous perennials, growing in the United States of America and Canada.

The drug occurs in cylindrical, simple or branched, sometimes tortuous pieces about 2·5 to 10 centimetres long and 4 to 14 millimetres in diameter, grey or brownish-grey, longitudinally wrinkled and transversely fissured, some pieces bearing scars of rootlets. The fracture is short. The smoothed, transversely cut surface exhibits a brownish cortex, and a large, yellowish-white, porous wood. Pith is present in pieces of the rhizome. Laticiferous tissue, present in the pith and cortex, is visible with a lens as small brown specks, and the parenchymatous cells of the pith, cortex and medullary rays are filled with numerous starch grains of varying shapes from 5 to 17 microns in diameter, some of which are compound, consisting of 2 or 3 components. It is inodorous, but has a disagreeable, very bitter taste.

Apocynum **contains** the glycoside, cymarin, to which its physiological action is due, and apocynin (acetovanillone). Cymarin on hydrolysis with cold hydrochloric acid yields cymarose and cymarigenin; the latter is identical with strophanthidin and with apocynamarin from *A. androsæmifolium* Linn.

Substitute.—The rhizome and root of *Apocynum androsæmifolium* Linn. somewhat resemble Apocynum, but are distinguished by the presence of small groups of stone cells in the bark.

Standard.—Apocynum contains not more than 5 per cent. of stems and other foreign organic matter.

Action and Uses.—Apocynum belongs to the group of cardiac tonics and has an action resembling, in the main, that of digitalis. It differs from digitalis, however, in that it is more irritant to the gastro-intestinal tract, and in large doses may cause gastric ulcerations. It has been used as a diuretic in cardiac dropsy. It has no direct action on the kidneys, but increases the efficiency of the heart. On account of its irritant action, apocynum should be used with caution and it should not be prescribed in acute conditions or when there is inflammation of the stomach or intestines. It may be **administered** as the tincture.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

Preparation

Tinctura Apocyni, B.P.C.—(Tinct. Apocyn.)—Tincture of Apocynum. *Syn.*—Tincture of Canadian Hemp. 1 in 10. Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

APOMORPHINÆ HYDROCHLORIDUM

(Apomorph. Hydrochlor.)

Apomorphine Hydrochloride

$C_{17}H_{17}O_2N,HCl,\frac{1}{2}H_2O = 312{\cdot}6$

Apomorphine hydrochloride may be obtained by heating morphine with hydrochloric acid under pressure. It occurs as a greyish-white, glistening, microcrystalline powder which becomes green on exposure to air and light. The aqueous solution is neutral to litmus and colourless, but becomes green on exposure to air and light, the change being retarded by the addition of dilute hydrochloric acid. A dilute aqueous solution yields, on the addition of sodium bicarbonate solution, a precipitate which is white at first, becoming green; the precipitate is soluble in many organic solvents, giving with alcohol (90 per cent.) a green solution, with chloroform a blue solution, and with ether a purple solution. The precipitate obtained on the addition of silver nitrate solution to an aqueous solution of apomorphine hydrochloride darkens rapidly. Apomorphine hydrochloride should be **stored** in a well-closed container and protected from light; solutions decompose readily.

Soluble in water (1 in 50) and alcohol (1 in 50); slightly soluble in chloroform and ether.

Standard, B.P.—Apomorphine hydrochloride loses, when dried at 100°, not more than 5 per cent. of its weight. Ash, not more than 0·1 per cent. It complies also with a limit test for decomposition products.

Action and Uses.—Apomorphine differs from morphine in that it has a stimulant action on the medulla and is employed almost entirely to produce emesis. If injected hypodermically, 0·006 gramme ($\frac{1}{10}$ grain) will produce vomiting in a few minutes; taken by the mouth, the same dose would act merely as an expectorant and diaphoretic, increasing and rendering less tenacious the bronchial mucus. It also differs from morphine in that it increases oxidation and tissue breakdown, whilst morphine diminishes them. Apomorphine resembles morphine in depressing sensory nerve cells in the brain and so relieving pain. Small non-emetic doses are injected hypodermically as a sedative in alcoholic excitement and delirium tremens.

Apomorphine hydrochloride is **administered** in the form of Syrupus Apomorphinæ for its action as an expectorant. It is an ingredient of some diamorphine preparations and is added for its expectorant action; its emetic property prevents the abuse of such preparations by addicts. Apomorphine hydrochloride is **incompatible** with alkaline substances. Apomorphine and its salts should be examined immediately before use, and the hydrochloride rejected if an emerald-green colour is produced when 1 part is shaken with 100 parts of water. Injectio Apomorphinæ Hypodermica, containing 1 per cent. w/v of the salt and 1 per cent. v/v of dilute hydrochloric acid in recently boiled and cooled distilled water, was included in the British Pharmacopœia, 1914, and was administered in doses of 5 to 10 minims. A solution for **injection** may be sterilised by

tyndallisation or by filtration and, if kept, should be stored in containers, protected from light, which comply with the tests for the limit of alkalinity of glass.

Dose.– Expectorant, 0·001 to 0·002 gramme ($\frac{1}{64}$ to $\frac{1}{32}$ grain); emetic or hypnotic, 0·002 to 0·008 gramme ($\frac{1}{32}$ to $\frac{1}{8}$ grain), by subcutaneous injection.

Preparation

Syrupus Apomorphinæ, B.P.C.—(Syr. Apomorph.)—Syrup of Apomorphine. Each fluid drachm contains $\frac{1}{16}$ grain of apomorphine hydrochloride with dilute hydrochloric acid, alcohol (90 per cent.), distilled water and syrup. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

AQUA DESTILLATA
(Aq. Dest.)
Distilled Water
$H_2O = 18·016$

Distilled water is prepared by the distillation of potable water. It is a clear, colourless, tasteless and odourless liquid.

Standard, B.P.—Distilled water yields, on evaporation to dryness on a water-bath, not more than 0·001 per cent. w/v of residue. It complies with limit tests for sulphate, chloride, lead, copper, iron, ammonia and oxidisable matter.

Action and Uses.—Distilled water is used as a solvent. For the preparation of solutions for administration by injection, and also for eye lotions, it is necessary to use sterilised water (Aqua Sterilisata) owing to the bacterial contamination of ordinary distilled water. Intravenous injections should be prepared with sterilised redistilled water which is not more than twenty-four hours old (sterilised water for intravenous injections); for other purposes sterilised water should be used within a month of its distillation. Distilled water, twice redistilled from glass vessels and then sterilised, is sometimes used for the preparation of intravenous injections and certain biological preparations. Intravenous and subcutaneous injections of large quantities of normal saline or other sterile solutions, prepared with distilled water, may cause a rise in temperature and systemic disturbance.

Preparation

Aqua Sterilisata, B.P.—(Aq. Steril.)—Sterilised Water. Distilled water collected in glass receivers, transferred to hard glass containers which are closed so as to exclude bacteria, and sterilised by heating in an autoclave or by boiling for thirty minutes. It must be used within one month of its preparation. Sterilised water for intravenous injections is distilled water redistilled in chemically clean apparatus, the first part of the distillate being rejected and the remainder collected in sterilised hard glass containers which are sealed and sterilised by heating in an autoclave or by boiling for thirty minutes; it must be used within twenty-four hours of its preparation.

ARAROBA
(Ararob.)

Araroba

Synonyms—Crude Chrysarobin; Goa Powder.

Araroba is the substance found in cavities in the trunk of *Andira Araroba* Aguiar (Fam. Leguminosæ), a large tree growing in the damp forests of Bahia, Brazil. It is scraped out of the cavities together with woody debris and is exported in a crude and moist condition as a coarse, amber-brown powder, containing numerous fragments of wood. This material is dried and powdered.

It occurs as a brownish-yellow to dark brown powder. When 1 milligram of benzene extract is mixed on a white tile with a drop of fuming nitric acid, and one drop of dilute solution of ammonia carefully added, a brilliant evanescent, blue-violet colour, which rapidly becomes dull reddish-violet, is produced at the line of contact. **Microscopically,** the powder shows the presence of numerous, minute, yellow, prismatic crystals, and granular, amorphous particles accompanied by fragments of woody tissue.

Araroba **contains** chrysophanolanthranol, the monomethylether of dehydroemodinanthranol, chrysophanol (chrysophanic acid), with smaller amounts of ararobinol, emodinmonomethylether, the anthranol of emodinmonomethylether and traces of emodin.

Standard.—Araroba yields to hot benzene not less than 50 per cent. of extractive.

Action and Uses.—The action of araroba depends on the presence of chrysarobin. It may be applied **externally** in the form of an ointment, 1 in 16, in lard, as a stimulant and parasiticide in psoriasis, acne rosacea and ringworm. The preparation should be diluted with an equal quantity of lard when it is to be used on a tender skin.

ARECA
(Arec.)

Areca

Synonyms—Arecæ Semina; Areca Nuts; Betel Nuts.

Areca consists of the dried, ripe seeds of *Areca Catechu* Linn. (Fam. Palmæ), a palm cultivated in tropical India, in the Philippines and in the East Indian Islands.

The seeds have the shape of a short, rounded cone and are about 20 to 27 millimetres long and 22 to 25 millimetres wide. The surface is brownish and is marked with a network of pale, depressed lines running chiefly from the hilum, which is situated at the base. The seeds are very hard and a transverse section exhibits a ruminate endosperm, the dark folds of the seed coats ramifying throughout the white endosperm;

they have no characteristic odour, but possess an astringent, bitter taste.

The diagnostic **microscopical** characters are the cells of the endosperm with thick, colourless, cellulosic walls, perforated by large, circular, simple pits and containing small amounts of protein and oil; the sclerenchymatous cells of the seed coats with moderately thick, lignified and pitted walls; the cells of the ruminations, which have thin, pitted walls and dark reddish-brown contents; the thick-walled, fibrous cells from the funicle.

Areca **contains** the liquid, volatile alkaloid, arecoline, $C_8H_{13}O_2N$, which forms crystalline salts. Other alkaloids present are guvacine (1 : 2 : 5 : 6-tetrahydropyridine-3-carboxylic acid), guvacoline, the methyl ester of guvacine, arecaidine (arecaine), its N-methyl derivative, and arecolidine. Arecoline is the methyl ester of arecaidine. The drug also contains about 15 per cent. of a red, amorphous tannin and about 14 per cent. of fat, together with resin and mucilage.

Areca in powder (Pulvis Arecæ : Pulv. Arec.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Areca is mildly astringent and is used chiefly in veterinary practice as a vermifuge for tape-worm. It is **administered** in the form of powder, or mixed with honey, syrup, or butter. In tropical countries areca is used as a masticatory.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

ARECOLINÆ HYDROBROMIDUM.—Arecoline hydrobromide, $C_8H_{13}O_2N$, HBr, occurs as fine, white, stable, needle-shaped crystals, easily soluble in water and alcohol, and soluble with difficulty in ether and chloroform. It melts at about 170°. Arecoline has an action very similar to that of pilocarpine. It excites the cranio-sacral autononuc nerve-endings. There is thus increased tonus and automatic movements in most plain muscle throughout the body. The muscles chiefly affected are those of the alimentary canal, uterus and bronchioles; it also causes constriction of the pupil and slowing of the heart. It is a powerful sialagogue. The action of arecoline is completely antagonised by atropine. Arecoline hydrobromide is employed by hypodermic injection in veterinary practice as a cathartic in the treatment of impaction of the colon and similar conditions. The dose for horses is ½ to 1½ grains. It is given orally as a tænicide to dogs in doses of $\frac{1}{10}$ to ½ grain after a preliminary period of fasting. A 1 per cent. solution has been suggested for reducing intra-ocular tension in glaucoma; it is irritating to the conjunctiva and its myotic effect is of short duration.

ARGENTI NITRAS

(Argent. Nit.)

Silver Nitrate

$AgNO_3 = 169{\cdot}9$

Silver nitrate may be prepared by dissolving silver in nitric acid and crystallising the product. It occurs in colourless, odourless,

transparent, tabular crystals, having a bitter, metallic taste. It should be **stored** protected from light.

Soluble in water (2 in 1) and alcohol (1 in 25); slightly soluble in ether and glycerin.

Standard, B.P.—Silver nitrate contains not less than 99·8 per cent. of $AgNO_3$. It complies also with a limit test for copper, bismuth and lead.

Action and Uses.—Silver nitrate is a valuable caustic and astringent; when applied to living tissues it combines with the proteins forming a thick coating of white albuminate, which becomes brown and finally black as the silver salt is reduced to oxide. It is used to destroy warts and other small skin growths. Dilute solutions are disinfectant and astringent. Silver nitrate is, however, precipitated by chlorides, and for this reason many new silver compounds compatible with chlorides have been introduced. Silver salts taken internally are absorbed and if continued for long periods are deposited, combined with organic matter, in blue-grey granules. These granules are chiefly found in the connective tissue and produce the pigmentation of the skin, known as argyria, characteristic of chronic silver poisoning. Silver nitrate has been used internally for dyspepsia, vomiting, gastric catarrh and ulceration, diarrhœa, and for epilepsy, chorea and other nervous diseases. Clinical experience has shown that it is useless in epilepsy and it is very doubtful if any silver ever reaches the central nervous system.

If **administered** internally, silver nitrate should be prescribed in the form of pills, massed with kaolin ointment. All solutions of silver salts should be dispensed in amber-coloured, glass-stoppered bottles. Silver nitrate stains may be removed with solution of potassium cyanide. It is used **externally** in aqueous solution as an eye lotion, 0·2 to 0·6 per cent. w/v, as an application to the conjunctiva, 1 to 2 per cent. w/v, as an injection into the urethra, 0·025 to 0·2 per cent. w/v., as an application to ulcers of different kinds and to the fauces in inflammatory conditions, 2 to 6 per cent. w/v, and as a paint in pruritus ani or pruritus vulvæ, 1 per cent. w/v. A 5 per cent. solution in spirit of nitrous ether is used as an application to the skin for eczema and as a toughening agent for the prevention of bed sores. For cauterising purposes it is used in the form of Argenti Nitras Mitigatus or Argenti Nitras Induratus, the former containing only one-third its weight of the silver salt. A 1 per cent. w/v solution is a valuable prophylactic against ophthalmia neonatorum. It is an ingredient of hair dyes, a solution of pyrogallol usually being the reducing agent.

Silver nitrate is **incompatible** with alkalis, halogen acids and their salts, phosphates, hydrocyanic acid and its salts, tannin and astringent preparations, etc. In cases of **poisoning** with silver salts, demulcent drinks with a good proportion of common salt should be given. After vomiting has been induced, copious draughts of milk should be taken and, finally, a dose of castor oil.

Dose.– 0·008 to 0·016 gramme ($\frac{1}{8}$ to $\frac{1}{4}$ grain).

Preparations

Argenti Nitras Induratus, B.P.—(Argent. Nit. Indur.)—Toughened Silver Nitrate. Silver nitrate and potassium nitrate fused together and poured into moulds. It contains not less than 94 per cent. and not more than 96 per cent. of $AgNO_3$. It should be stored away from light.

Argenti Nitras Mitigatus, B.P.C.—(Argent. Nit. Mitig.)—Mitigated Silver Nitrate. *Syn.*—Mitigated Caustic; Argenti Nitras Dilutus. Silver nitrate and potassium nitrate fused together and poured into moulds. It contains not less than 32 per cent. and not more than 34 per cent. of $AgNO_3$.

This preparation was included in the British Pharmacopœia, 1914.

ARGENTI OXIDUM

(Argent. Oxid.)

Silver Oxide

$Ag_2O = 231{\cdot}8$

Silver oxide may be prepared by adding a slight excess of sodium, potassium, or calcium hydroxide to a solution of silver nitrate. The product should be well washed with recently boiled water, and dried below 80°. When prepared for use in conjunction with methyl iodide as a methylating agent, hot solutions of barium hydroxide and silver nitrate should be used and every care observed to prevent access of carbon dioxide during the preparation. It occurs as a heavy, brownish-black, inodorous powder, having an unpleasant, metallic taste. Some doubt exists concerning its stability at temperatures in the neighbourhood of 100°, but when heated above 250° rapid dissociation into metallic silver and oxygen ensues. When freshly precipitated it dissolves in solution of ammonia, the solution so formed leaving black crystals of $Ag_2O,2NH_3$ on evaporation which, when dry, explode with the minimum amount of friction. Its solution in water acts as a strong base, but the corresponding silver hydroxide has never been isolated. Silver oxide should be **stored** in amber-tinted bottles.

Very slightly **soluble** in water; insoluble in alcohol.

Standard.—Silver oxide, determined, after solution in nitric acid, by the method of the British Pharmacopœia for Argenti Nitras, contains not less than 99·5 per cent. of Ag_2O, calculated on the substance dried at 80°; each millilitre of N/10 ammonium thiocyanate is equivalent to 0·01159 gramme of Ag_2O. Loss on drying at 80°, not more than 1 per cent. 1 gramme, dissolved in 1 millilitre of nitric acid and 4 millilitres of water, remains clear and colourless on the addition of slight excess of solution of ammonia (absence of copper, bismuth and lead).

Action and Uses.—Silver oxide has been used internally for gastric pain and dyspepsia, also in chorea and epilepsy. It is absorbed in minute amounts only. It has a milder and less irritating action than the nitrate, because of its slight solubility. It is **administered** in pills massed with kaolin ointment. If prescribed with creosote, phenol, or

other similar substance, it should first be mixed with some inert powder such as kaolin to prevent reduction as far as possible. Silver oxide is **incompatible** with bromides, iodides, chlorides, acids, ammonia, tannin and many organic substances. It may decompose with explosive violence if triturated with combustible or readily oxidisable substances.

Dose.– 0·03 to 0·12 gramme ($\frac{1}{2}$ to 2 grains).

ARGENTI PROTEINAS
(Argent. Protein.)
Silver Proteinate

Synonyms—Argento-Proteinum Forte; Strong Silver Protein.

Silver proteinate may be prepared by the action of silver salts, or moist silver oxide, on albumose or gelatin in the presence of alkali. It occurs as a fine, brownish-yellow powder. Solutions of the salt are quite clear and are not coagulated by the action of heat, nor are they precipitated by the addition of alkali, alkali sulphides, alkali salts, or albumen; they do not stain the skin or clothes. The compound chars when heated, giving off an odour resembling that of burnt hair; on complete incineration, a greyish-white residue is left which gives the reactions of silver. When 5 millilitres of a 2 per cent. aqueous solution with 5 millilitres of sodium hydroxide solution is diluted with 10 millilitres of water, and 2 millilitres of a 2 per cent. copper sulphate solution added, a violet colouration appears after a few minutes. A 1 per cent. aqueous solution is alkaline to litmus and gives a precipitate with ferric chloride solution; with dilute hydrochloric acid it gives a precipitate of unaltered proteinate which is soluble on warming; with sodium chloride there is no immediate turbidity, and, after the addition of ammonia and treatment with hydrogen sulphide, a dark colouration is produced, but no precipitation. Mercuric chloride solution produces a white precipitate, the supernatant liquid becoming nearly colourless. It should be **stored** in well-stoppered bottles protected from light.

Soluble in water (1 in 2); almost insoluble in alcohol, chloroform and ether.

Standard.—Silver proteinate contains not less than 7·5 per cent. and not more than 8·5 per cent. of Ag. Shake 1 gramme with 10 millilitres of alcohol and filter; no turbidity is produced on the addition of 2 millilitres of dilute hydrochloric acid (limit of silver salts).

Assay.—Slowly incinerate about 3 grammes, accurately weighed, and heat the residue with 10 millilitres of nitric acid until no more coloured fumes are evolved; dilute to 150 millilitres and titrate with N/10 ammonium thiocyanate, using ferric ammonium sulphate solution

as indicator; each millilitre of N/10 ammonium thiocyanate is equivalent to 0·01079 gramme of Ag.

Action and Uses.—Silver proteinate is used for its local antiseptic properties. Compounds belonging to this group are much less germicidal than silver nitrate, but, relatively, they are non-corrosive and are less affected by body secretions. In strong solution (10 per cent. or more) silver proteinate is slightly irritating, but even strong solutions are non-astringent.

Silver proteinate is used for infections of the mucous membrane such as acute coryza, conjunctivitis, urethritis, tonsillitis, etc. For urethral injections, solutions of 1 or 2 per cent. are used, and, in tonsillitis, a 10 per cent. solution may be employed. In conjunctivitis, 2 to 10 per cent. solutions, and, for prevention of ophthalmia neonatorum, solutions up to 10 per cent. in strength have been used. Sometimes local argyria, especially of the eyelids, may occur from the use of silver proteinate. In acute gonorrhœa, solutions of from 0·25 to 1 per cent. and, in chronic gonorrhœa, solutions of from 2 to 10 per cent. are used; pessaries may contain from 5 to 10 per cent. For rectal irrigation, a solution of 0·1 per cent. may be employed; suppositories may contain from 5 to 10 per cent. Ointments, especially for ophthalmic use, may contain from 2 to 5 per cent. Solutions are best prepared by shaking the powder on to the surface of cold water and allowing it to dissolve slowly. They should be freshly prepared. Solutions of silver proteinate for **instillation** may be prepared by aseptic methods.

ARGENTI PROTEINAS MITE

(Argent. Protein. Mit.)

Mild Silver Proteinate

Synonyms—Argento-Proteinum Mite; Mild Silver Protein; Argenti Nucleinas; Silver Nucleinate; Argenti Vitellin; Silver Vitellin.

Mild silver proteinate is silver rendered colloidal by the action of protein and may be prepared by the action of denatured serum albumen, casein, or other suitable protein on moist silver oxide. It occurs as a brown powder, or nearly black scales or granules, which are odourless. It responds to the identity tests given under Argenti Proteinas, but is less germicidal in its action.

Freely, but slowly, **soluble** in water; almost insoluble in alcohol, chloroform and ether.

Standard.—Mild silver proteinate, determined by the method for Argenti Proteinas, contains not less than 19·0 per cent. and not more than 25·0 per cent. of Ag. It complies with the limit test for silver salts in Argenti Proteinas.

Action and Uses.—Mild silver proteinate, and compounds belonging to the group, are designated mild owing to their lack of irritant qualities, and because their antiseptic properties are less than those of silver proteinate. The chief application of mild silver proteinate is as an antiseptic and as a mechanical cleanser of mucous membrane. It is used in the same conditions as silver proteinate, but is preferable when it is important to avoid irritation. In conjunctivitis, solutions of 25 per cent., or an ointment of 10 per cent. strength, may be employed. A 25 per cent. solution is used as a prophylactic of ophthalmia neonatorum, a 50 per cent. solution for application to corneal ulcers, and as a spray for the nose and throat, 10 to 20 per cent. solution, or, as a swab, 25 to 50 per cent. solution. For gonorrhœa, a 3 to 10 per cent. solution may be used for injection in the acute stages, and 10 to 20 per cent. in the chronic stages. As a urethral irrigation, 1 in 1000 solution is employed. Bougies may contain 1 or 2 per cent. In cystitis, solutions of 10 to 50 per cent. are used. Pessaries containing from 5 to 10 per cent. of mild silver proteinate are used in vaginitis. Mild silver proteinate has been administered by mouth as a gastro-intestinal antiseptic. Solutions of colloidal silver are opaque to X-rays and, in concentrations of 15 or 20 per cent., are employed in X-ray diagnosis of abnormal conditions of the kidney and bladder. Solutions of mild silver proteinate for **instillation** may be prepared by aseptic methods.

ARISTOLOCHIA
(Aristoloch.)

Aristolochia

Synonyms—Indian Birthwort; Sapsun.

Aristolochia consists of the dried stem and root of *Aristolochia indica* Linn. (Fam. Aristolochiaceæ), a shrubby, twining plant indigenous to India.

The pieces of stem, which form the greater part of the drug, vary in length, being usually about 10 centimetres, and are from 5 to 10 millimetres in diameter, yellowish-brown, sub-cylindrical, and twisted. The external surface is warty in most pieces, and the thinner pieces of stem are marked with longitudinal furrows and a few transverse fissures. The transversely cut surface exhibits a large porous wood in wedge-shaped portions, separated by a few wide medullary rays and surrounded by a thin yellowish-brown bark. The root is tortuous, reddish-brown in colour, and exhibits occasional transverse constrictions or fissures. The bark, like that of the stem, is thin and easily separated. The wood in the root resembles that of the stem. The fracture is short and uneven in the root; in the stem, it is short in the bark, while the wood bends without breaking. The drug has an aromatic odour, and a bitter, camphoraceous taste.

Aristolochia **contains** a bitter principle which may be alkaloidal

in nature, and a volatile oil which probably contains borneol; it is also said to contain aristin, aristinic acid, resin, tannin and starch.

Action and Uses.—Aristolochia is used in India and the Eastern Colonies for its bitter properties, its action resembling that of gentian and serpentary. The action of the bitter principle resembles that of aloin, but it is more toxic and in large doses it may produce vomiting and purging. In rabbits it causes nephritis with albuminuria and uræmic symptoms. It is **administered** in the form of tincture, Tinctura Aristolochiæ, 1 in 5 of alcohol (70 per cent.); dose, 2 to 4 millilitres (½ to 1 fluid drachm).

ARMORACIA
(Armor.)

Horseradish

Synonyms—Armoraciæ Radix; Horseradish Root.

Horseradish is the fresh root of cultivated plants of *Cochlearia Armoracia* Linn. (Fam. Cruciferæ), a perennial herb indigenous to Eastern Europe, naturalised and cultivated in Great Britain. It may be collected at any season, but is most active in autumn and in early spring before the leaves appear.

The root is nearly cylindrical in shape, 25 to 40 or more centimetres in length and 2 to 4 centimetres in diameter; externally, it is pale yellowish-white and bears three double rows of fibrous rootlets or of the scars left by their removal; internally, it is almost white and when scraped or bruised, a characteristic, mustard-like odour develops; the taste is pungent. The upper part of the root is marked with transverse scars of leaves and has a greenish tint.

Horseradish **contains** the glycoside, sinigrin (potassium myronate), which is decomposed in the presence of water by the enzyme, myrosin, which is also present. The products of the decomposition are a volatile oil (allyl isothiocyanate), potassium acid sulphate and dextrose. The root also contains resin, sugar and starch. Alkaloids are absent.

Action and Uses.—Horseradish has been used as a counter-irritant in lumbago, sciatica and similar painful affections, and as a vesicant. Where the application of cantharidin is contra-indicated, the freshly pulped root is spread on the affected area and left for fifteen minutes, or until the required degree of reaction is produced. Spiritus Armoraciæ Compositus has carminative properties, and an infusion (1 in 20) has been used as a gargle, and administered as a stimulant.

Preparation

Spiritus Armoraciæ Compositus, B.P.C.—(Sp. Armor. Co.)—Compound Spirit of Horseradish. A distilled spirit representing 1 in 8 of horseradish, with dried bitter-orange peel and nutmeg. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

This spirit was included in the British Pharmacopœia, 1914.

ARNICÆ FLOS
(Arnic. Flos.)
Arnica Flower

Synonyms—Arnicæ Flores; Arnica Flowers.

Arnica flower consists of the dried flowerheads of *Arnica montana* Linn. (Fam. Compositæ), a small herbaceous perennial, indigenous to Central Europe. It should be **stored** in a cool, dry place.

The receptacle is nearly flat, from 3 to 8, mostly about 5·5, millimetres in diameter, with two rows of dark green, linear-lanceolate, pubescent, involucral bracts and is often found detached from the florets. The ray florets are from 2 to 3·5 centimetres long and number about 16; they possess conspicuous, orange-yellow, ligulate corollas, terminating in 3, or occasionally 4 or 5, acute teeth and traversed by 7 to 9, or rarely up to 15, veins. The disc florets are numerous with a 5-toothed, tubular corolla. The ovaries and fruits are 5-ribbed and are clothed with appressed twin hairs; they are surmounted by a pappus, the bristles of which are from 4 to 6 cells in diameter and are barbed by the exsertion of the pointed apices of the cells. The flowers have an aromatic odour and an acrid bitter taste.

Arnica flower **contains** the bitter, yellow, crystalline body, arnicin, a volatile oil, and the colourless, crystalline phytosterol, arnisterol.

Substitutes.—The receptacles and involucres are sometimes removed so as to minimise the liablity to insect attack. The flowerheads of *Inula britannica* Linn. are occasionally offered as arnica flower; they are distinguished by the 4-veined, ligulate corollas.

Standard.—Arnica flower contain not more than 2 per cent. of foreign organic matter. Proportion of receptacles with their attached involucres, not less than 25 per cent. and not more than 33 per cent. Alcohol-soluble extractive (45 per cent. alcohol), not less than 15 per cent.

Arnica flower, in powder (Pulvis Arnicæ Floris : Pulv. Arnic. Flor.), contains the constituents of Arnicæ Flos and complies with the limit for alcohol-soluble extractive of the unground drug.

Action and Uses.—Arnica flower has an irritant effect upon the stomach and intestines. As a local application for sprains and bruises, where the skin is not too tender or broken, the tincture, Tinctura Arnicæ Floris, has been employed.

Preparation

Tinctura Arnicæ Floris, B.P.C.—(Tinct. Arnic. Flor.)—Tincture of Arnica Flower. 1 in 10. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914, under the name of Tinctura Arnicæ Florum.

ARNICÆ RHIZOMA

(Arnic. Rhiz.)

Arnica Rhizome

Synonyms—Arnicæ Radix; Arnica Root.

Arnica rhizome consists of the dried rhizome and rootlets of *Arnica montana* Linn. (Fam. Compositæ), a perennial with a small, creeping rhizome, indigenous to Central Europe. It is collected after the stem has died down in the autumn.

The rhizome is horizontal, cylindrical, dark brown, and varies from 2·5 to 5 centimetres in length and from 4 to 6 millimetres in thickness; it is usually curved, bearing brittle, wiry rootlets on its under surface, rough from the presence of encircling scars of cataphyllary leaves and scars left where roots have broken off, and often terminated by the hairy remains of the aerial stem and leaves. The transverse section exhibits a rather thick, yellowish cortex, near the inner margin of which is a circle of dark brown oleo-resin ducts; in the centre is a large pith surrounded by a circle of yellowish wood bundles. The odour is faint and aromatic, and the taste bitter and acrid.

Arnica rhizome **contains** from 0·5 to 1 per cent. of a volatile oil having a pungent, aromatic taste, and the bitter, yellow, crystalline principle, arnicin; tannin and inulin are also present, but starch is absent.

Substitutes.—Rhizomes of *Geum urbanum* Linn. (Fam. Rosaceæ) and of species of *Hieracium* (Fam. Compositæ) are sometimes present. The former is distinguished by its clove-like odour and both by the absence of oleo-resin ducts.

Standard.—Arnica rhizome contains not more than 2 per cent. of foreign organic matter. Ash, not more than 12 per cent. Alcohol-soluble extractive (70 per cent. alcohol), not less than 14 per cent.

Arnica rhizome, in powder (Pulvis Arnicæ Rhizomæ : Pulv. Arnic. Rhiz.), contains the constituents of Arnicæ Rhizoma and complies with the limits for ash and alcohol-soluble extractive of the unground drug.

Action and Uses.—The action of arnica rhizome is the same as that of the flower. The tincture, with or without dilution with water, is a popular application for sprains and bruises when the skin is unbroken. Liniment of arnica is applied with friction as a mild counter-irritant, but cases of arnica dermatitis from the local application of arnica preparations have been reported.

Preparations

Linimentum Arnicæ, B.P.C.—(Lin. Arnic.)—Liniment of Arnica. *Syn.*—Arnica Opodeldoc. A solid preparation containing tincture of arnica root, 1 in 4, with hard soap, camphor and alcohol (90 per cent.).

Tinctura Arnicæ Radicis, B.P.C.—(Tinct. Arnic. Rad.)—Tincture of Arnica Root. *Syn.*—Tincture of Arnica. 1 in 20.

ARSENI TRIIODIDUM
(Arsen. Triiod.)

Arsenic Triiodide

$AsI_3 = 455{\cdot}7$

Synonyms—Arsenii Iodidum; Arsenious Iodide.

Arsenic triiodide may be obtained by the direct combination of arsenic and iodine and purification of the product by crystallisation from carbon disulphide, toluene, or other solvent. It occurs in small crystals of an orange-red colour. The crystalline masses of arsenic triiodide found in commerce are obtained by fusing the elements together; they contain uncombined iodine and arsenic and are not completely soluble in water, forming a yellow solution with blackish, insoluble flocks. An aqueous solution of arsenic triiodide has a strongly acid reaction due to partial hydrolysis. The solution is colourless at first, but becomes yellow on standing, owing to liberation of iodine.

Soluble in water (1 in 18), alcohol (1 in 42), ether, chloroform and carbon disulphide.

Standard, B.P.—Arsenic triiodide contains not less than 99·0 per cent. of AsI_3. Residue on volatilisation, not more than 0·5 per cent. It does not lose iodine when heated at 100°.

Action and Uses.—Arsenic triiodide has an action similar to that of arsenic trioxide. It may be administered in pills, massed with lactose and glycerin of tragacanth. More generally it is given in mixtures in the form of Donovan's solution (Liquor Arseni et Hydrargyri Iodidi), but this solution is **incompatible** with alkaloids and with many other substances and should preferably be prescribed alone.

Dose.– 0·004 to 0·016 gramme ($\frac{1}{16}$ to $\frac{1}{4}$ grain).

Preparation

Liquor Arseni et Hydrargyri Iodidi, B.P.—(Liq. Arsen. et Hydrarg. Iod.)—Solution of Arsenous and Mercuric Iodides. *Syn.*—Donovan's Solution. It contains 1 per cent. w/v of red mercuric iodide (limits, 0·95 to 1·05) and total arsenic equivalent to 1 per cent. w/v of arsenic triiodide (limits, 0·95 to 1·05), in distilled water. 1 millilitre contains the equivalent of about 0·01 gramme and 15 minims contains the equivalent of about $\frac{1}{4}$ grain of each salt. The arsenous compound in the solution is rapidly oxidised to the arsenic state by contact with air. The solution should be freshly prepared or, if not used immediately, it should be stored in well-filled containers protected from light. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

ARSENI TRIOXIDUM
(Arsen. Trioxid.)

Arsenic Trioxide

$As_2O_3 = 197{\cdot}9$

Synonyms—Acidum Arseniosum; Arsenious Anhydride; Arsenious Acid; Arsenious Oxide.

Arsenic trioxide is prepared by roasting arsenical ores and purifying

the product by resublimation. It occurs as a heavy, white powder, or in white, irregular lumps with a vitreous fracture usually with a stratified appearance, and often containing both the transparent and the opaque varieties. When heated it sublimes, forming transparent octahedral crystals. On the addition of stannous chloride solution to a dilute solution of arsenic trioxide in hydrochloric acid, a brown colouration or precipitate is produced.

Very slowly **soluble** in water (about 1 in 65), the rate depending upon the relative proportions of the two varieties present and upon the degree of subdivision, boiling water (1 in 20) and glycerin (about 1 in 8); slightly soluble in alcohol. It is more readily soluble in water in the presence of acids or alkalis.

Standard, B.P.—Arsenic trioxide contains not less than 99·8 per cent. of As_2O_3. Residue on volatilisation, not more than 0·1 per cent. It complies also with a test for absence of arsenious sulphide.

Action and Uses.—Arsenic trioxide appears to possess a selective action upon the cells of the intestinal mucous membrane and is chiefly absorbed at this site. After absorption there is an augmented breakdown of proteins, an increase in the lactic acid content of the blood and in the nitrogen excreted in the urine. Arsenic trioxide is given internally because of its beneficial effect on metabolism, for its value as a general tonic and for its use in improving the appetite. There is no evidence, however, that it directly causes an increased formation of red blood cells in normal individuals. Inorganic forms of arsenic were used formerly in the treatment of protozoal diseases such as syphilis, malaria and trypanosomiasis, but organic arsenical compounds are now employed. Arsenic trioxide is believed to influence the nutrition of the skin and it is given, therefore, in such skin diseases as psoriasis and chronic eczema, which are affected probably by dilatation of the skin vessels. Large doses of arsenic trioxide are sometimes given in lymphadenoma and leukæmia. It is excreted much more slowly than pentavalent, organically combined, arsenic compounds, and for this reason cumulative poisoning is readily produced. Excessive doses of arsenic trioxide cause severe irritation of the alimentary canal, with vomiting and diarrhœa, and fatty degeneration of the liver occurs when a large quantity of arsenic is absorbed. Chronic poisoning, produced by repeated small doses, is shown by a discolouration of the skin, conjunctivitis, laryngitis, multiple peripheral neuritis and occasionally jaundice and cirrhosis.

Arsenic trioxide is **administered** usually as Liquor Arsenicalis in mixtures, or pills containing the oxide may be given. It is best administered after meals. Arsenic trioxide, mixed with morphine or cocaine, is used to destroy nerves before filling teeth, and arsenical solution mixed with tincture of ipecacuanha is employed in the treatment of pyorrhœa and stomatitis. Arsenic trioxide is commonly employed for the destruction of rats and mice, and as a constituent of weed-killers and sheep dips. In cases of acute arsenical **poisoning,**

Antidotum Arsenum should be administered; the stomach should subsequently be emptied, stimulants given, and warmth applied.

Dose.– 0·001 to 0·005 gramme ($\frac{1}{60}$ to $\frac{1}{12}$ grain).

Preparations

Antidotum Arsenum, B.P.C.—(Antidot. Arsen.)—Arsenic Antidote. It contains freshly precipitated ferric hydroxide and light magnesium oxide. Dose.– 120 millilitres (4 fluid ounces).

Liquor Arseni Acidus, B.P.C.—(Liq. Arsen. Acid.)—Acid Solution of Arsenic. *Syn.*—Liquor Arsenici Hydrochloricus. It contains from 0·95 per cent. to 1·05 per cent. w/v of arsenic trioxide in distilled water acidified with hydrochloric acid. 0·5 millilitre contains 0·005 gramme and 8 minims contains about $\frac{1}{12}$ grain of arsenic trioxide. Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

This solution was included in the British Pharmacopœia, 1914, under the name of Liquor Arsenici Hydrochloricus.

Liquor Arseni Alkalinus, B.P.C.—(Liq. Arsen. Alk.)—Alkaline Solution of Arsenic. It contains from 0·95 per cent. to 1·05 per cent. w/v of arsenic trioxide in 1 per cent. w/v solution of potassium carbonate with compound tincture of lavender. 0·5 millilitre contains 0·005 gramme and 8 minims contains about $\frac{1}{12}$ grain of arsenic trioxide. Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

This solution was included in the British Pharmacopœia, 1914, under the name of Liquor Arsenicalis.

Liquor Arsenicalis, B.P.—(Liq. Arsen.)—Arsenical Solution. *Syn.*—Solutio arsenicalis seu Fowleri I.A.; Fowler's Solution. A solution of arsenic trioxide, 1 per cent. w/v, in potassium hydroxide, neutralised with dilute hydrochloric acid (limits, 0·95 to 1·05). The growth of fungus may be prevented by sterilising the solution in the containers by boiling for half an hour. 0·5 millilitre contains 0·005 gramme and 8 minims contains about $\frac{1}{12}$ grain of arsenic trioxide. Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

Liquor Auri et Arseni Brominatus, B.P.C.—(Liq. Aur. et Arsen. Brominat.)—Brominated Solution of Gold and Arsenic. *Syn.*—Liquor Auri et Arsenii Bromidi; Liquor Auri Bromidi Arsenatus. 0·6 millilitre contains the equivalent of 0·0028 gramme of arsenic trioxide and 0·002 gramme of auric bromide; 10 minims contains the equivalent of $\frac{1}{12}$ grain of arsenic trioxide and $\frac{1}{8}$ grain of auric bromide. Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

Liquor Potassii Arsenatis et Bromidi, B.P.C.—(Liq. Pot. Arsen. et Brom.)—Solution of Potassium Arsenate and Bromide. *Syn.*—Liquor Arsenii Bromidi; Clemens' Solution. A solution containing potassium arsenate and potassium bromide, prepared from arsenic trioxide, 1 per cent. w/v, with potassium bicarbonate, bromine and distilled water. Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

Pasta Arsenicalis, B.P.C.—(Past. Arsen.)—Arsenical Paste. Arsenic trioxide, 2 parts, and morphine hydrochloride, 1 part, mixed to a paste with creosote.

Pilulæ Asiaticæ, B.P.C.—(Pil. Asiatic.)—Asiatic Pills. Each pill contains $\frac{1}{12}$ grain of arsenic trioxide and $\frac{2}{3}$ grain of pepper. Dose.– 1 pill.

Pilulæ Ferri Carbonatis cum Arseno et Strychnina, B.P.C.—(Pil. Ferr. Carb. c. Arsen. et Strych.)—Pills of Iron Carbonate with Arsenic and Strychnine. *Syn.*—Blaud's Pills with Arsenic and Strychnine. Each pill contains $\frac{1}{10}$ grain of arsenic trioxide, $\frac{1}{100}$ grain of strychnine hydrochloride and 5 grains of pill of iron carbonate. Dose.– 1 or 2 pills.

Pilulæ Ferri Carbonatis et Arseni, B.P.C.—(Pil. Ferr. Carb. et Arsen.)—Pills of Iron Carbonate and Arsenic. *Syn.*—Blaud's Pills with Arsenic. Each pill contains $\frac{1}{60}$ grain of arsenic trioxide and 5 grains of pill of iron carbonate. Dose.—1 pill.

Pilulæ Ferri et Arseni, B.P.C.—(Pil. Ferr. et Arsen.)—Iron and Arsenic Pills. *Syn.*—Pilulæ Ferri Arsenicales Each pill contains 3 grains of exsiccated ferrous sulphate and $\frac{1}{60}$ grain of arsenic trioxide. Dose.—1 pill.

ARSPHENAMINA

(Arsphenamin.)

Arsphenamine

Synonyms—Arsenobenzol; Arsenobenzene.

Arsphenamine may be prepared by the reduction of 3-nitro-4-hydroxyphenylarsonic acid in aqueous solution with sodium hyposulphite, in the presence of magnesium chloride, at 50° to 60° and the conversion of the base into its dihydrochloride. It consists mainly of the dihydrochloride of 3 : 3′-diamino-4 : 4′-dihydroxyarsenobenzene, $(NH_2)(OH)C_6H_3As : AsC_6H_3(OH)(NH_2),2HCl$. It is distributed in sealed glass phials from which air has been evacuated or replaced by an inert gas. It occurs as a pale yellow to yellow, dry, amorphous powder, freely mobile in contact with glass surfaces and without odour, except that due to traces of ether. An aqueous solution (1 in 100) is acid to litmus, but does not change the colour of congo-red paper to blue.

One millilitre of a 1 per cent. solution of arsphenamine, treated with 1 drop of a 5 per cent. solution of sodium nitrite, turns bright orange and 0·5 millilitre of the solution so produced, added to 1 millilitre of a 2 per cent. solution of betanaphthol in 2N sodium hydroxide, produces a clear, wine-red solution. Arsphenamine is soluble in 8 per cent. solution of sodium hydroxide, but not in saturated solution of sodium bicarbonate; the latter liberates the insoluble base with effervescence. It decolourises iodine solution and gives a precipitate with silver nitrate. The crystalline product obtained by the following process melts between 130° and 132°:—Suspend 1 gramme of arsphenamine in 5 millilitres of 2N ammonia and add 6 millilitres of hydrogen peroxide solution with stirring; when dissolved add 5 millilitres of 2N hydrochloric acid and 1 gramme of charcoal, stir well for one minute, filter, and add 1 millilitre of 2N ammonia; after ten minutes remove the 3-amino-4-hydroxyphenylarsonic acid which crystallises on stirring, wash and add it to a solution of 1 gramme of thiolacetamide in 20 millilitres of water; heat until solution is complete, add 0·2 gramme of charcoal, boil for thirty seconds and filter; cool until a slight permanent opalescence is produced, and gently rub with a glass rod until crystallisation is induced; keep for a few minutes, filter, wash with cold water and dry at 95°. Arsphenamine should be **stored** at a temperature below 15°, and is then stable for at least two years.

Readily **soluble** in water and methyl alcohol; sparingly soluble in alcohol.

Standard.—Arsphenamine is controlled by regulations made under the Therapeutic Substances Act, 1925. The standard preparation for Great Britain and Northern Ireland is a quantity of arsphenamine kept in the National Institute for Medical Research, London. It complies with biological tests, carried out in an institution or laboratory approved by the licensing authority, for maximum toxicity and therapeutic potency. It contains, when determined by an approved method, not less than 30 and not more than 34 per cent. of As. When 0·5 gramme of the powder is added to 35 millilitres of water at 20°, it dissolves completely within fifteen minutes, yielding a clear, pale yellow solution, free from suspended particles. When 1 millilitre of a 15 per cent. aqueous solution of sodium hydroxide is added to this solution of arsphenamine, it causes a preliminary separation of the insoluble arseno-base, which, on gently shaking, redissolves in the excess of alkali to form a clear, bright yellow solution. This solution, diluted to 250 millilitres with a 0·5 per cent. sodium chloride solution, gives a clear, light yellow solution. The product in sealed phials, kept at a temperature of 56° for not less than twenty-four hours, retains its colour, physical properties and solubility.

Assay.—The proportion of arsenic may be determined by the method given under Sodii Aminarsonas.

Action and Uses.—It was due to Ehrlich's hypothesis, that pentavalent arsenicals such as sodium aminarsonate are reduced in the body to the trivalent form, that the spirochæticidal power of the arsphenamines was realised. The therapeutic application of this research constitutes the greatest achievement yet made, not only in the treatment of syphilis but in the whole of chemotherapy (see Neoarsphenamina).

Arsphenamine is **administered** by intravenous injection. It is too irritant to be given subcutaneously or intramuscularly. For intravenous **injection** a slightly alkaline solution containing the di-sodium salt is prepared. This is less toxic than either the base or the mono-sodium salt, and is formed by dissolving the contents of a sealed container in cold, sterilised and recently distilled water, adding a 15 per cent. solution of sodium hydroxide until the precipitate first formed redissolves and then diluting with 0·5 per cent. solution of sodium chloride in cold, sterilised and recently distilled water so that each 50 millilitres of solution contains 0·1 gramme of arsphenamine. All solutions of arsphenamine should be freshly prepared immediately before use from material that is not discoloured. Arsphenamine has, almost completely, yielded place to neoarsphenamine in therapeutics, because of the difficulty of its preparation for injection and its much greater toxicity.

Dose.—0·1 to 0·6 gramme (1½ to 10 grains), by intravenous injection.

ARSPHENAMINA ARGENTICA
(Arsphenamin. Argent.)
Silver Arsphenamine

Silver arsphenamine is the sodium salt of silver 3 : 3′-diamino-4 : 4′-dihydroxyarsenobenzene and may be prepared by the action of a soluble silver salt on arsphenamine. It occurs as an odourless, brownish-black powder. It is distributed in glass phials, which are either evacuated or filled with an inert gas, and hermetically sealed. It should be **stored** at a temperature which does not rise above 15°.

Readily **soluble** in water.

Standard.—Silver arsphenamine is controlled by regulations made under the Therapeutic Substances Act, 1925. It complies with biological tests, carried out in an institution or laboratory approved by the licensing authority, for maximum toxicity and therapeutic potency. It contains, when determined by an approved method, not less than 18 per cent. and not more than 21 per cent. of As, and not less than 12 per cent. and not more than 13 per cent. of Ag. The aqueous solution, 1 in 20, is almost black in colour and is alkaline to litmus. The aqueous solution gives no precipitate on the addition of sodium hydroxide or sodium carbonate, but a precipitate is produced on the addition of sodium bicarbonate.

Assay.—For arsenic. The proportion of arsenic may be determined by the method given under Sodii Aminarsonas, using 0·25 gramme.

For silver. Dissolve about 0·25 gramme, accurately weighed, in 10 millilitres of water, add 5 grammes of ammonium persulphate and boil until colourless; dilute to about 50 millilitres with water, add 1 millilitre of nitric acid and titrate with N/50 ammonium thiocyanate, using ferric ammonium sulphate as indicator; each millilitre of N/50 ammonium thiocyanate is equivalent to 0·002158 gramme of Ag.

Action and Uses.—Silver arsphenamine has about twice the spirochæticidal value of arsphenamine, but is, however, more toxic. It is given intravenously and is used in advanced cases of syphilis. Sometimes silver arsphenamine is still given in early cases, but usually it is reserved for syphilis of the central nervous system. Solutions for **injection** are prepared by dissolving the contents of a sealed container in sterilised water.

Dose.—0·1 to 0·6 gramme (1½ to 10 grains), by intravenous injection.

ASAFŒTIDA
(Asafœt.)
Asafetida

Asafetida is an oleo-gum-resin obtained from the living rhizome and root of *Ferula fœtida* Regel, *F. rubricaulis* Boiss., or other

species of *Ferula* (Fam. Umbelliferæ), indigenous to Eastern Persia and Western Afghanistan. In the cortex of the stem and root are numerous large, schizogenous ducts containing a milky emulsion which exudes when the ducts are wounded. The drug is obtained by cutting off the stem close to the crown of the root; the exuded juice hardens and is then scraped off. It should be **stored** in well-closed containers in a cool place.

The oleo-gum-resin occurs in rounded or flattened tears, mostly from 12 to 25 millimetres in diameter, or in masses of agglutinated tears, greyish-white to dull yellow in colour. The tears are yellowish and translucent or milky-white and opaque internally, but the freshly fractured surface slowly darkens on exposure to the air, becoming pink, then red, and finally reddish-brown. The fractured surface acquires a bright red or reddish-brown colour when touched with sulphuric acid, becoming violet when the acid is washed off; the freshly broken surface, touched with a drop of nitric acid (50 per cent. v/v), gives a green colouration. Asafetida forms a white emulsion when triturated with water. It has a powerful and persistent alliaceous odour and a bitter, acrid, alliaceous taste.

Asafetida **contains** about 40 to 64 per cent. of resin, 25 per cent. of gum, and 6 to 17 per cent. of volatile oil. The resin consists of asaresinotannol partly free and partly combined with ferulic acid. The volatile oil contains in the lower boiling fraction two terpenes, one apparently identical with pinene, while from the higher boiling portions the disulphides, $C_7H_{14}S_2$ and $C_{11}H_{20}S_2$, have been separated. The drug also contains free ferulic acid, water, and small quantities of various impurities. Pure tear asafetida usually contains from 65 to 75 per cent. of substances soluble in alcohol, and yields about 3 to 5 per cent. of ash. When a 10 per cent. tincture, obtained by boiling the drug, powdered by trituration with sand, with alcohol (90 per cent.), is filtered into an equal volume of alcohol (90 per cent.), previously rendered alkaline by the addition of 10 per cent. of dilute solution of ammonia, no fluorescence is produced (distinction from galbanum). When asafetida is boiled for some minutes with hydrochloric acid and the solution then made alkaline with ammonia solution and diluted, a blue fluorescence is produced (presence of combined umbelliferone).

Substitute.—Mass asafetida consists of an agglutinated mass of tears mixed with various extraneous materials such as stones, slices of the root, gypsum, earthy matter, etc. Asafetida in the form of paste also occurs in commerce; it is often purplish-red when fresh, and slowly darkens and hardens on keeping. Powdered asafetida does not represent the official drug.

Standard, B.P.—Asafetida yields not more than 50 per cent. of matter insoluble in alcohol (90 per cent.). Ash, not more than 15 per cent.

Action and Uses.—Asafetida is used as a carminative in flatulence and as a sedative in hysterical and allied conditions. It is used as an

enema for intestinal flatulence. Tinctura Asafœtidæ contains the resin and volatile oil, the gum being insoluble in the alcohol used in its preparation. Spiritus Ammoniæ Fetidus is an alcoholic solution of the volatile oil and resin to which ammonia has been added; the resin gives it a diuretic action. When it is desirable to cover the taste and odour of asafetida, it should be administered in pills. The best excipient is water, and the pills should be coated, first with a thin layer of acacia (by moistening with mucilage of acacia and afterwards drying), and then with sandarac varnish, or they may be pearl-coated. Pills containing asafetida should be well varnished before silvering, otherwise the sulphuretted oils of the drug turn the silver black. Asafetida is often combined with valerian or valerianates, and when the tincture is added to water, mucilage of acacia should be added to suspend the resin.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

SAGAPENUM.—Sagapenum is the gum-resin obtained from a species of *Ferula*, said by some authorities to be *Ferula persica* Willd., and by others to be *F. Szowitziana* DC. (Fam. Umbelliferæ), growing in Arabia and Persia. It occurs either in separate, broken tears, or in masses. The tears vary in colour from yellow to yellowish-red and are more or less translucent. Masses are dark brownish or reddish-yellow, with a granular, resinous fracture, slightly translucent in small fragments. The odour is alliaceous, but more aromatic and not so strong as that of asafetida. The taste is nauseous, bitter and acrid. The surface of fractured tears does not appear pink (distinction from asafetida). It is partly soluble in alcohol and in ether. Sagapenum contains resin, 50 to 60 per cent., gum, 23 to 30 per cent., and volatile oil, containing sulphur, 3 to 11 per cent. The resin contains umbelliferone and sagaresinotannol. A mixture of galbanum and asafetida has been sold as sagapenum. Sagapenum has been employed similarly to asafetida and galbanum in amenorrhœa and hysteria, but it is now rarely used. Dose.– 0·6 to 2 grammes (10 to 30 grains).

Preparations

Pilula Aloes et Asafœtidæ, B.P.—(Pil. Aloes et Asafœt.)—Pill of Aloes and Asafetida. Aloes and asafetida, of each about 30 per cent., with hard soap and syrup of liquid glucose. Dose.– 0·25 to 0·5 gramme (4 to 8 grains).

Pilulæ Asafœtidæ, B.P.C.—(Pil. Asafœt.)—Asafetida Pills. Each pill contains 3 grains of asafetida. Dose.– 1 or 2 pills.

Pilulæ Galbani Compositæ, B.P.C.—(Pil. Galban. Co.)—Compound Pills of Galbanum. *Syn.*—Compound Pills of Asafetida. Each pill contains 1 grain each of asafetida, galbanum and myrrh. Dose.– 1 or 2 pills.

Spiritus Ammoniæ Fetidus, B.P.C.—(Sp. Ammon. Fetid.)—Fetid Spirit of Ammonia. A distilled spirit representing 7·5 per cent. w/v of asafetida and containing 10 per cent. v/v of strong solution of ammonia. Dose.– For a single administration, 4 to 6 millilitres (1 to 1½ fluid drachms); for repeated administration, 1·2 to 2·5 millilitres (20 to 40 minims).

This spirit was included in the British Pharmacopœia, 1914.

Tinctura Asafœtidæ, B.P.—(Tinct. Asafœt.)—Tincture of Asafetida. 1 in 5, prepared by maceration in alcohol (70 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ATROPINA
(Atrop.)

Atropine

$C_{17}H_{23}O_3N = 289{\cdot}2$

Atropine is *dl*-hyoscyamine, an alkaloid obtained by the racemisation of *l*-hyoscyamine extracted from *Atropa Belladonna* Linn., *Hyoscyamus muticus* Linn., and other solanaceous plants. It occurs in colourless, odourless, acicular crystals, or as a microcrystalline powder, and gives an alkaline solution in water. Atropine may be distinguished from hyoscyamine by the melting-point of its aurichloride. The aurichloride is precipitated when a solution of gold chloride is added to a 1 per cent. solution of the alkaloidal base in water acidified with hydrochloric acid, and is purified by recrystallisation from boiling water acidified with hydrochloric acid. Atropine aurichloride melts at 137° to 139°; hyoscyamine aurichloride melts at about 165°. When a trace of atropine is mixed with a few drops of nitric acid and evaporated to dryness on a water-bath, the residue has a faintly yellow colour which changes to violet on being moistened with freshly prepared alcoholic potassium hydroxide solution. This reaction is also given by hyoscyamine and by hyoscine but not by homatropine.

Soluble in water (about 1 in 500), alcohol (1 in 3), ether (about 1 in 16) and chloroform.

Standard, B.P.—Atropine has a melting-point of 114° to 116°. Ash, not more than 0·1 per cent. It complies with a limit test for *l*-hyoscyamine and with tests for the absence of apoatropine, readily carbonisable substances, and many other alkaloids.

Action and Uses.—The action of atropine is in the main twofold. Firstly, it stimulates the central nervous system, where it acts especially on the motor area, affecting co-ordinated movements and causing, in large doses, restlessness, talkativeness and delirium. Secondly, it paralyses the terminations of the parasympathetic nerves which supply glands, plain muscle and the heart. To lessen secretions atropine is of service when taken internally. It is of value in diminishing excessive salivation, bronchial secretion and secretion of gastric juice. By virtue of its depressant action on the vagus, atropine quickens the heart rate and is of use in cases of poisoning by muscarine, pilocarpine and the like, where the slowing of the heart is marked. It has been found that in patients suffering from typhoid fever there is lessened vagal control and that atropine causes little or no increase in the pulse rate. The use of atropine before the administration of an anæsthetic is of value partly as a stimulant to the respiratory centre and partly for its action in diminishing secretions. It is often combined with morphine.

The action of atropine on the gut is complicated; small doses diminish peristalsis while large doses increase the activity of the gut. The first

action is due to paralysis of the vagal endings while the latter action may be due to stimulation of Auerbach's plexus. Atropine is added to purgatives to prevent griping. In ophthalmology, atropine is extensively used. In small doses, applied in solution or in the form of lamella or ointment to the conjuctiva, the pupil is dilated and accommodation paralysed. In this way rest of an inflamed organ is ensured. It has the disadvantage that its effect is extraordinarily persistent and may last for several days. A further disadvantage is that since atropine causes a rise in intra-ocular tension, a case of latent glaucoma may be precipitated into an acute attack. To relax spasmodic contractions of involuntary muscle, atropine is of considerable value and is used for this purpose in renal and biliary colic and in asthma. Perhaps this action may also explain the beneficial effects which follow its use in incontinence of urine in children. Atropine diminishes uterine contractions and is used in the treatment of dysmenorrhœa. A rash may follow the administration of this drug.

In cases of **poisoning** by atropine, when taken by the mouth (not uncommonly taken in the form of belladonna fruits by children), 1·2 grammes (20 grains) of tannic acid should be given in 120 millilitres (4 fluid ounces) of water, and then the stomach evacuated by means of a syphon tube or emetic. Morphine has been advised although its use cannot be recommended. After hypodermic injection, chloroform and ether may be helpful in controlling the spasms. In the stage of depression which follows that of excitement, caffeine should be used and artificial respiration employed. Pilocarpine is useless.

Dose.– 0·00025 to 0·001 gramme ($\frac{1}{240}$ to $\frac{1}{60}$ grain).

Preparations

Chloroformum Atropinæ, B.P.C.—(Chlorof. Atrop.)—Chloroform of Atropine. Atropine, about 1 in 220, in chloroform, coloured with alkanna.

Collodium Atropinæ, B.P.C.—(Collod. Atrop.)—Atropine Collodion. Atropine, about 1 in 220, in acetone and acetone collodion.

Unguentum Atropinæ, B.P.C.—(Ung. Atrop.)—Atropine Ointment. Atropine, 1 per cent., in white soft paraffin.

The atropine ointment of the British Pharmacopœia, 1914, contained atropine, 2 per cent. w/w, and oleic acid, 8 per cent. w/w, in lard.

ATROPINÆ SULPHAS

(Atrop. Sulph.)

Atropine Sulphate

$$(C_{17}H_{23}O_3N)_2,H_2SO_4,H_2O = 694{\cdot}5$$

Atropine sulphate is the sulphate of the alkaloid atropine. It occurs in colourless, odourless crystals, or as a white, microcrystalline powder. The alkaloidal base is precipitated when the aqueous solution is rendered alkaline by the addition of sodium hydroxide solution and, when washed and dried, it responds to the reactions given under Atropina.

Soluble in water (about 2 in 1), and alcohol (1 in 4); insoluble in ether and chloroform.

Standard, B.P.—Atropine sulphate, when dried at 136°, has a melting-point of 195° to 196°. Loss on drying at 105°, not more than 3 per cent. Ash, not more than 0·1 per cent. It complies also with a limit test for hyoscyamine and with a test for the absence of apoatropine.

Action and Uses.—The action of atropine sulphate is identical with that of the alkaloid. This salt is generally employed in making hypodermic solutions and other preparations containing atropine. Liquor Atropinæ Sulphatis is used, either alone or diluted with sterilised water, for the eyes. Lamellæ Atropinæ are prepared for ophthalmic use. As a substitute for glycerin of belladonna, Glycerinum Atropinæ will be found more cleanly. Atropine salts are **incompatible** with alkalis, tannic acid and salts of mercury. A solution for **injection** may be sterilised by tyndallisation or by filtration, and the containers should comply with the tests for limit of alkalinity of glass. The treatment of cases of **poisoning** by atropine salts is described under Atropina.

Dose.– 0·00025 to 0·001 gramme ($\frac{1}{240}$ to $\frac{1}{60}$ grain).

ATROPINÆ METHYLBROMIDUM.—Atropine methylbromide or mydriasine, $C_{17}H_{23}O_3N,CH_3Br$, is an addition compound of the alkaloid and methyl bromide and occurs in white crystals, melting at about 222°. It is readily soluble in water (1 in 1), slightly soluble in alcohol, and insoluble in chloroform and ether. It is given internally for the same purposes as atropine, but has less action on the heart and brain. It is used as a mydriatic in 0·5 to 2 per cent. solution, the effect passing off more rapidly than that of atropine. Dose.– 0·001 to 0·002 gramme ($\frac{1}{60}$ to $\frac{1}{30}$ grain).

ATROPINÆ METHYLNITRAS. — Atropine methylnitrate, $C_{17}H_{23}O_3N$, CH_3NO_3, may be prepared by the interaction of atropine methylbromide and silver nitrate. It occurs as a white, crystalline powder, soluble in water. It is used as a mydriatic in 1 to 5 per cent. aqueous solution and has been given internally in the treatment of various spastic conditions. Atropine methylnitrate is administered subcutaneously prior to operations on the oral cavity in order to diminish the secretion of saliva. Dose.– 0·001 to 0·002 gramme ($\frac{1}{60}$ to $\frac{1}{30}$ grain).

ATROPINÆ SALICYLAS.—Atropine salicylate, $C_{17}H_{23}O_3N,C_7H_6O_3$, occurs as colourless crystals, or as a white, crystalline powder. It is soluble in water (1 in 20) and in alcohol.

Preparations

Glycerinum Atropinæ, B.P.C.—(Glycer. Atrop.)—Glycerin of Atropine. Atropine sulphate, 1 in 400, in compound tincture of lavender and glycerin.

Lamella Atropinæ, B.P.—(Lamell. Atrop.)—Lamella of Atropine. Each lamella contains 0·000013 gramme ($\frac{1}{5000}$ grain) of atropine sulphate.

Liquor Atropinæ Sulphatis, B.P.C.—(Liq. Atrop. Sulph.) Solution of Atropine Sulphate. Atropine sulphate, 1 per cent. w/v, in distilled water. Dose.– 0·03 to 0·06 millilitre ($\frac{1}{2}$ to 1 minim).

This solution, prepared with recently boiled and cooled distilled water, was included in the British Pharmacopœia, 1914. It is intended for internal administration only.

Oculentum Atropinæ, B.P.—(Oculent. Atrop.)—Atropine Ointment for the Eye. Atropine sulphate, 0·25 per cent., in simple eye ointment. It should be stored in small, well-closed containers, in a cool place, and protected from light.

Oculentum Atropinæ of the British Pharmaceutical Codex, 1923, is included under the name of Unguentum Atropinæ (see Atropina).

Oculentum Atropinæ cum Hydrargyri Oxido, B.P.—(Oculent. Atrop. c. Hydrarg. Oxid.)—Atropine and Yellow Mercuric Oxide Ointment for the Eye. Atropine sulphate, 0·125 per cent., and yellow mercuric oxide, 1 per cent., in simple eye ointment. It should be stored in small, well-closed containers, in a cool place, and protected from light.

An ointment for the eye, prepared with moist yellow mercuric oxide ointment, atropine and yellow soft paraffin, was included in the British Pharmaceutical Codex, 1923.

Oculentum Atropinæ et Cocainæ, B.P.C.—(Oculent. Atrop. et Cocain.)—Atropine and Cocaine Eye Ointment. Atropine sulphate, about 0·25 per cent., and cocaine hydrochloride, about 0·5 per cent., in simple eye ointment.

Oculentum Iodoformi et Atropinæ, B.P.C.—(Oculent. Iodof. et Atrop.)—Iodoform and Atropine Eye Ointment. Iodoform, about 5 per cent., and atropine sulphate, about 0·1 per cent., in simple eye ointment.

AURANTII CORTEX RECENS

(Aurant. Cort. Rec.)

Fresh Bitter-Orange Peel

Fresh bitter-orange peel is the fresh, outer part of the pericarp of the ripe, or nearly ripe, fruit of *Citrus Aurantium* Linn. subsp. *amara* Engl. (Fam. Rutaceæ). Bitter oranges are cultivated chiefly in the south of Spain (Seville) and in Sicily (Palermo); the fruits are collected before they are quite ripe, the ripening usually being completed during transport. The peel is removed with as little as possible of the white "zest" adhering, but at the same time care is taken to avoid unnecessarily rupturing the oil glands which are situated in considerable number just below the epidermis of the fruit. The peel is best obtained during February and March since the Spanish fruit is not usually imported until the end of January.

The outer surface is pitted and is of a red or deep orange-red colour, internally only a very small amount of the white, spongy part of the pericarp is attached. The drug has a fragrant odour, and an aromatic bitter taste. The transversely cut surface moistened with hydrochloric acid assumes a dark green colour, a reaction which is sometimes useful in identifying the drug.

The diagnostic **microscopical** characters are the small, polygonal epidermal cells; the parenchymatous tissue situated below the epidermis, containing large oil glands and numerous crystals of calcium oxalate.

Bitter-orange peel **contains** volatile oil and an amorphous, glycosidal bitter principle, aurantiamarin. Other constituents are hesperidin, a colourless, tasteless, crystalline glycoside, which occurs chiefly in

the white "zest" of the peel, *iso*hesperidin, hesperic acid, a bitter resin and aurantiamaric acid.

Standard, B.P.—Fresh bitter-orange peel is required to contain but little of the white, spongy part of the pericarp.

Action and Uses.—Fresh bitter-orange peel is used as a flavouring agent and for its bitter, stomachic and carminative properties.

Preparations

Elixir Simplex, B.P.C.—(Elix. Simp.)—Simple Elixir. Tincture of orange, about 1 in 13, with syrup and distilled water. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Extractum Aurantii Liquidum, B.P.C.—(Ext. Aurant. Liq.)—Liquid Extract of Orange. About 1 in 1. Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

Syrupus Aurantii, B.P.—(Syr. Aurant.)—Syrup of Orange. Tincture of orange, 1 in 8, with syrup. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

• **Tinctura Aurantii, B.P.**—(Tinct. Aurant.)—Tincture of Orange. Fresh bitter-orange peel, about 1 in 4, prepared by maceration in alcohol (90 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

AURANTII CORTEX SICCATUS

(Aurant. Cort. Sicc.)

Dried Bitter-Orange Peel

Synonym—Aurantii Amari Cortex.

Dried bitter-orange peel is the dried, outer part of the pericarp of the ripe, or nearly ripe, fruit of *Citrus Aurantium* Linn. subsp. *amara* Engl. (Fam. Rutaceæ). It is imported chiefly from Malta, usually in narrow, machine-cut strips (gelatin cut), or in wider spiral strips. Owing to excessive rupturing of the oil glands it is not equal in aroma to hand-cut, English-dried peel.

Dried bitter-orange peel possesses the characters and diagnostic microscopical features of the fresh peel. The fracture is short. It yields to alcohol (60 per cent.) about 30 to 40 per cent. of extractive.

Substitutes.—Larger pieces or "quarters" are sometimes seen in commerce, but they have much of the white "zest" attached to them. Dried sweet-orange peel may sometimes be mixed with that of the bitter-orange. It may be distinguished by its paler, more yellowish colour, and by being thinner and much less bitter in taste. Lemon peel is scarcely changed in colour by hydrochloric acid. Indian orange peel (Aurantii Cortex Indicus) is the fresh or the dried, outer part of the pericarp of varieties of *C. Aurantium* Linn. grown in India and Ceylon.

Standard, B.P.—Dried bitter-orange peel is required to contain not more than a very small amount of the white, spongy part of the pericarp.

Action and Uses.—Dried bitter-orange peel is used in many preparations as a flavouring agent, and for its bitter stomachic and carminative properties.

Preparations

Infusum Aurantii Compositum Concentratum, B.P.C.—(Inf. Aurant. Co. Conc.)—Concentrated Compound Infusion of Orange Peel. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh compound infusion of orange peel and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Infusum Aurantii Compositum Recens, B.P.C.—(Inf. Aurant. Co. Rec.)—Fresh Compound Infusion of Orange Peel. Dried bitter-orange peel, 1 in 40, with lemon peel and clove. When compound infusion of orange peel or Infusum Aurantii Compositum is prescribed, fresh infusion not being specified, either Infusum Aurantii Compositum Recens, or Infusum Aurantii Compositum Concentratum, suitably diluted, may be dispensed. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This infusion was included in the British Pharmacopœia, 1914, under the name of Infusum Aurantii Compositum.

Infusum Aurantii Concentratum, B.P.—(Inf. Aurant. Conc.)—Concentrated Infusion of Orange Peel. Dried bitter-orange peel, about 1 in 2½, extracted with alcohol (25 per cent.). This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of orange peel and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

A concentrated infusion, prepared with dilute chloroform water, alcohol (90 per cent.) and tincture of orange, was included in the British Pharmaceutical Codex, 1923.

Infusum Aurantii Recens, B.P.—(Inf. Aurant. Rec.)—Fresh Infusion of Orange Peel. 1 in 20. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Syrupus Aromaticus, B.P.C.—(Syr. Aromat.)—Aromatic Syrup. Liquid extract of orange peel, 1 in 16, with cinnamon water and syrup. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This syrup replaces the aromatic syrup of the British Pharmacopœia, 1914, which was prepared with 25 per cent. v/v of tincture of orange, 25 per cent. v/v of cinnamon water, and syrup.

AURI BROMIDUM

(Aur. Brom.)

Potassium Bromaurate

$KAuBr_4,2H_2O = 592{\cdot}0$

Synonym—Gold Bromide.

Potassium bromaurate may be obtained by the action of bromine water on gold in the presence of the equivalent of potassium bromide. It occurs as a blackish or brown powder, or in reddish crystals.

Soluble in water (1 in 5) and alcohol.

Action and Uses.—The principal action of gold salts is on metabolism. They are reputed to have the power of facilitating the absorption of pathological connective tissue. Potassium bromaurate is used for various forms of nervous diseases, especially those of an hysterical

nature, but with doubtful success. Its use for removing scar tissue and in epilepsy is not based upon any reliable evidence. It has also been employed in inveterate cases of tertiary syphilis. On the alimentary canal it exerts the ordinary effects of the metals, and in large doses will produce vomiting and diarrhœa. When injected into the circulation it produces an effect like that of arsenic. The salts of gold are commonly **administered** in solution or in pills prepared by rubbing with a little kaolin and massing with kaolin ointment. Some advertised "cures" for alcoholism are said to contain a gold salt. Doses increasing to 0·03 gramme ($\frac{1}{2}$ grain) are sometimes given.

Dose.– 0·001 to 0·012 gramme ($\frac{1}{60}$ to $\frac{1}{5}$ grain).

ACIDUM BROMAURICUM.—Bromauric acid may be obtained by the action of hydrobromic acid on solution of auric bromide. On evaporation, the solution deposits large, red, flat, needle-shaped crystals, $HAuBr_4,5H_2O$ or $HAuBr_4,6H_2O$, which melt at about 27°. It may be recrystallised from ether or chloroform. It is decomposed by concentrated sulphuric acid at 155° into aurous bromide and bromine.

AURI CHLORIDUM.—Gold chloride usually consists of sodium chloraurate, $NaAuCl_4,2H_2O$, which is soluble in water and ether (distinction from the potassium salt). It is much more stable than the acid and its water of crystallisation cannot be driven off without also decomposing the salt. Chlorauric acid may be obtained by dissolving gold in nitro-hydrochloric acid, adding an excess of hydrochloric acid, and evaporating the solution. It occurs in yellow crystals which deliquesce in moist air to a yellow solution. Two definite hydrates are known, $HAuCl_4,3H_2O$ and $HAuCl_4,4H_2O$, and it yields well defined salts. Gold chloride has properties similar to those of gold bromide and may be administered in pills compounded with kaolin ointment. It is used in making Lange's colloidal gold, a preparation used as a diagnostic reagent in the examination of cerebrospinal fluid in diseases of the central nervous system. The chloride is also used in photography. Dose.– 0·001 to 0·012 gramme ($\frac{1}{60}$ to $\frac{1}{5}$ grain).

Preparation

Liquor Auri et Arseni Brominatus, B.P.C.—(Liq. Aur. et Arsen. Brominat.)—Brominated Solution of Gold and Arsenic. *Syn.*—Liquor Auri et Arsenii Bromidi; Liquor Auri Bromidi Arsenatus. 0·6 millilitre contains the equivalent of 0·0028 gramme of arsenic trioxide and 0·002 gramme of auric bromide; 10 minims contains the equivalent of $\frac{1}{24}$ grain of arsenic trioxide and $\frac{1}{32}$ grain of auric bromide. Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

AURI ET SODII THIOSULPHAS

(Aur. et Sod. Thiosulph.)

Gold Sodium Thiosulphate

$Na_3Au(S_2O_3)_2,2H_2O = 526·5$

Synonym—Sodium Aurothiosulphate.

Gold sodium thiosulphate may be prepared by the interaction of gold chloride with a solution of sodium thiosulphate. The resulting solution is treated with alcohol and the precipitate purified by crystallisation from water. It occurs in white, crystalline needles, without

odour, and has a sweet taste. Its aqueous solution is neutral to litmus and does not precipitate proteins from solution. The dry salt is stable in dry air, and may be **stored** in sealed ampoules without undergoing decomposition. When exposed to moist air, the product is likely to decompose and become yellowish, especially if exposed to light, and it is then unsuitable for use. Dilute aqueous solutions, 1 in 100, are moderately stable and may be sterilised at 100°. More concentrated solutions are liable to decompose on heating or on exposure to light.

Very readily **soluble** in water; insoluble in alcohol.

Standard.—Gold sodium thiosulphate contains not less than 37·0 per cent. and not more than 37·6 per cent. of Au. When kept in sealed phials at 75° for twenty-four hours, it retains its colour, physical properties and solubility.

Assay.—Dissolve about 0·8 gramme, accurately weighed, in 50 millilitres of water, add 10 millilitres of N/1 sodium hydroxide and 10 millilitres of hydrogen peroxide solution (20 vols.); boil until the excess of hydrogen peroxide is decomposed, acidify with hydrochloric acid, allow the precipitate of metallic gold to coagulate, filter, wash thoroughly with boiling water, dry, ignite and weigh.

Action and Uses.—Gold sodium thiosulphate, when injected intravenously, is for the most part rapidly absorbed from the blood stream, although some remains unabsorbed for twenty-four hours or longer. It is slowly excreted from the system, partly through the alimentary tract but principally through the kidneys. It is said to exert a specific action on tubercle bacilli, but since its action is not strictly in accordance with the generally accepted ideas of a chemotherapeutic agent, its use is more or less empirical. In the treatment of pulmonary tuberculosis it is most satisfactory in the early, moderately advanced and exudative type of case, although old, chronic cases may benefit if treatment is carefully carried out. Following the administration of gold sodium thiosulphate the sputum rapidly becomes free from tubercle bacilli and the patient shows an increase in weight and improvement in general condition. As an adjunct to collapse therapy, gold sodium thiosulphate has proved useful in selected cases since it clears up the "better" lung in bilateral cases. Tuberculous pleurisy has been treated with some success.

Gold sodium thiosulphate is generally contra-indicated when there is extensive bilateral fibrosis or extreme cachexia since it is likely to accelerate the progress of the disease. Febrile cases are also somewhat difficult to treat, but a good response may be obtained from small and carefully graduated doses. Intestinal tuberculosis, surgical tuberculosis and tuberculous meningitis are not generally benefited by the administration of this drug. Distinctly favourable results have been reported in lupus erythematosus, but patients with lupus vulgaris do not appear to be greatly benefited by the drug. Large doses (about 1 gramme) have been found effective in the treatment of syphilis, but the reactions that may occur are a drawback to its wider application.

It may, however, prove useful in cases where arsenic compounds and mercury are not well tolerated. Although only limited experience has been obtained with this drug in the treatment of leprosy, considerable improvement has been reported in a number of cases, particularly when used in conjunction with local treatment by carbon dioxide snow. Good results have been reported from the use of gold sodium thiosulphate in the treatment of rheumatic disease.

The administration of gold sodium thiosulphate, especially in large doses, is liable to be attended with reactions which are manifested chiefly by a rise in temperature, albuminuria, and skin reactions, such as localised rashes, papular eruptions or a generalised exanthema. To counteract these symptoms, solution of sodium thiosulphate should be injected intravenously. Even moderate doses of gold sodium thiosulphate may produce albuminuria and this should always be looked for and regarded as a warning to discontinue treatment until the urine is free from albumin. On this account treatment should be carried out with the patient under regular observation, institutional rather than ambulatory treatment being preferable. Gold sodium thiosulphate is **administered** by intravenous injection in solutions not exceeding 5 per cent. w/v in strength. Where intravenous injection presents any difficulty, intramuscular injection can be resorted to, but in this case the strength of the solution should be 3 per cent. in sterilised water, or preferably 5 or 10 per cent. in oily suspension. It should never be given by subcutaneous injection. It is generally considered advisable to commence with a dose of from 0·025 to 0·1 gramme ($\frac{2}{5}$ to $1\frac{1}{2}$ grains), gradually increasing at intervals of about seven days up to a maximum of about 1 gramme (15 grains) for males, or 0·75 gramme (11 grains) for females, or to the limit of tolerance, which may be less than these amounts. For children, the maximum is 0·5 gramme (8 grains). In the treatment of tuberculosis, the maximum tolerated amount can be repeated until a total of 5 or 6 grammes (75 or 90 grains) has been given; after an interval of three or four months a further course of doses can be given. A suitable initial dose in the treatment of rheumatism is 0·1 gramme ($1\frac{1}{2}$ grains), increased by 0·05 or 0·1 gramme at intervals of two or three days, but not more than 0·6 gramme (10 grains) should be administered in one week. Solutions for **injection** may be prepared by aseptic methods.

Dose.—0·025 to 1 gramme ($\frac{2}{5}$ to 15 grains), by injection.

AZORUBRUM

(Azorub.)

Bordeaux B

$C_{20}H_{12}N_2O_7S_2Na_2 = 502{\cdot}2$

Bordeaux B (Colour Index No. 88) is the sodium salt of α-naphthalene-azo-β-naphthol-3:6-disulphonic acid and may be prepared by coupling

diazotised α-naphthylamine with β-naphthol-3 : 6-disulphonic acid. It occurs as a brown powder. The colour of the aqueous solution is unaltered on the addition of hydrochloric acid, becomes yellowish-brown with sodium hydroxide and blue with sulphuric acid, the colour changing to magenta-red on dilution. It is reduced by hydrosulphite, the colour being discharged.

Soluble in water, giving a magenta-red solution; moderately soluble in alcohol, forming a bluish-red solution.

Standard.—Bordeaux B leaves not more than 65 per cent. of sulphated ash. Arsenic limit, 30 parts per million. Lead limit, 50 parts per million. Dissolve the sulphated ash from 1 gramme in 20 millilitres of water and 2 millilitres of dilute hydrochloric acid, and add 1 millilitre of potassium ferrocyanide solution; no precipitate is obtained (limit of zinc).

Uses.—Bordeaux B is practically unaffected by dilute acids and alkalis, or by exposure to sunlight. Owing to the greater permanence of the colour produced, it is extensively used in place of cochineal and cudbear as a colouring agent for medicines and foodstuffs. It may be used in the form of Liquor Azorubri, of which about 5 minims is usually sufficient for each fluid ounce of liquid.

Preparation

Liquor Azorubri, B.P.C.—(Liq. Azorub.)—Solution of Bordeaux B. *Syn.*—Liquor Ruber. Bordeaux B, 1 per cent. w/v, in glycerin and chloroform water.

BALSAMUM PERUVIANUM

(Bals. Peruv.)

Balsam of Peru

Balsam of Peru is obtained from the trunk of *Myroxylon Pereirœ* (Royle) Klotzsch (Fam. Leguminosæ), a tree growing in the forests of San Salvador in Central America. The formation of the balsam, which is not a normal secretion of the tree, is induced by gently beating the bark, which is then removed, and subsequently scorching the trunk. As the balsam exudes it is soaked up by rags with which the wounded places are covered; the rags are pressed and the crude balsam so obtained purified by boiling with water. The drug is exported chiefly from Acajutla and Belize to New York and Hamburg.

Balsam of Peru occurs as a dark brown, viscid liquid which is transparent and reddish-brown when viewed in thin layers. It has an agreeable, balsamic odour recalling that of vanillin, and a bitter, acrid taste with a persistent after-taste, causing a burning sensation in the throat. It is free from stringiness or stickiness. The specific gravity varies from 1·140 to 1·170. The commoner adulterants such as alcohol,

kerosene, fixed oil, turpentine, copaiba, etc., lower the specific gravity perceptibly. Balsam of Peru is also frequently adulterated with artificial esters such as benzyl benzoate; such samples usually have a high proportion of balsamic esters and a low saponification value.

Balsam of Peru **contains** from 53 to 66 per cent. of a colourless, aromatic, oily liquid and about 28 per cent. of a dark resin. The liquid portion, sometimes called "cinnamein," consists of a mixture of benzyl benzoate and benzyl cinnamate in varying proportions, the former usually predominating; the resin consists of a resin alcohol, peruresinotannol, combined with cinnamic acid and a little benzoic acid. The drug contains, in addition, an alcohol, peruviol, which possesses a sweet odour and taste, together with traces of vanillin and free cinnamic acid. Balsam of Peru of good quality may contain not more than 50 per cent. of balsamic esters.

Soluble in alcohol (1 in 1, the addition of more alcohol causing the solution to become turbid), and chloroform; partially soluble in ether and glacial acetic acid. Water shaken with the balsam removes only traces of cinnamic acid.

Standard, B.P.—Balsam of Peru contains not less than 53 per cent. of balsamic esters, the saponification value of which is not less than 235. It complies also with tests for the absence of fatty oils and of benzaldehyde and turpentine.

Action and Uses.—Balsam of Peru is an antiseptic expectorant, but is seldom used internally. Externally, it acts as an antiseptic and parasiticide, especially in scabies. It is sometimes used as an antiseptic for ulcerated surfaces, such as bedsores, and for chilblains. For external application it is usually employed in the form of ointment, and is sometimes applied in the treatment of skin diseases, undiluted or mixed with an equal quantity of castor oil. Suppositories may be prepared with oil of theobroma and sufficient white wax to counteract the softening effect of the balsam.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Preparations

Suppositorium Bismuthi Subgallatis Compositum, B.P.C.—(Supp. Bism. Subgall. Co.)—Compound Bismuth Subgallate Suppository. *Syn.*—Suppositorium Bismuthi et Resorcini Compositum; Compound Bismuth and Resorcin Suppository. Each suppository contains 3 grains of bismuth subgallate, 1 grain of resorcinol, 2 grains of zinc oxide and 1 minim of balsam of Peru.

Unguentum Peruvianum, B.P.C.—(Ung. Peruv.)—Balsam of Peru Ointment. Balsam of Peru, 12·5 per cent., in simple ointment.

Unguentum Zinci cum Balsamo Peruviano, B.P.C.—(Ung. Zinc. c. Bals. Peruv.)—Zinc Ointment with Balsam of Peru. Balsam of Peru, about 11 per cent., in ointment of zinc oxide and ointment of boric acid.

BALSAMUM TOLUTANUM
(Bals. Tolu.)
Balsam of Tolu

Synonym—Tolu.

Balsam of tolu is obtained from the trunk of *Myroxylon toluifera* H.B. and K. (Fam. Leguminosæ), a tree indigenous to New Granada. The balsam exudes from incisions made in the trunk and is collected in gourds, being afterwards transferred to skins and finally exported in tins. It is imported as a soft, tenacious, resinous substance which becomes harder on keeping and is brittle in cold weather. A small piece, warmed and pressed between two pieces of glass, forms a transparent, yellowish-brown film, which exhibits scattered crystals of cinnamic acid when examined under a lens. The balsam has a fragrant odour, and an aromatic, slightly acid taste. When a small piece is boiled with water, the filtered aqueous solution evolves the odour of benzaldehyde on warming with potassium permanganate solution. An alcoholic solution of balsam of tolu has an acid reaction and gives a green colour on the addition of ferric chloride solution.

Balsam of tolu **contains** 12 to 15 per cent. of free cinnamic acid, about 8 per cent. of free benzoic acid, a trace of vanillin and about 7·5 per cent. of an oily liquid consisting of benzyl benzoate with a little benzyl cinnamate. The resin, of which the balsam contains about 80 per cent., yields, on saponification, the alcohol, toluresinotannol, cinnamic acid, and a little benzoic acid. Good fresh balsam of tolu yields, when distilled with water, from 1·5 to 3·0 per cent. of a very fragrant volatile oil.

Soluble in alcohol, benzene, chloroform, ether and glacial acetic acid; partially soluble in carbon disulphide, the soluble portion consisting chiefly of cinnamic acid; it is also partially soluble in sodium hydroxide solution.

Standard, B.P.—Balsam of tolu contains not less than 19 per cent. and not more than 25 per cent. of free balsamic acids and not less than 35 per cent. and not more than 50 per cent. of total balsamic acids, both being calculated on the dry, alcohol-soluble matter. Alcohol-insoluble matter, not more than 4 per cent. Loss on drying in a thin layer in a vacuum over sulphuric acid, not more than 4 per cent. Acid value, 97 to 160; ester value, 47 to 95; saponification value, 170 to 224; all being calculated on the dry, alcohol-soluble matter. It complies also with a test for absence of colophony.

Action and Uses.—Balsam of tolu is an antiseptic expectorant. Its preparations are employed in cases in which the mucus is tenacious and removed with difficulty by coughing. Mixtures containing tincture of tolu require mucilage of acacia to suspend the resin in a diffusible form.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Liquor Tolutanus, B.P.C.—(Liq. Tolu.)—Solution of Tolu. Balsam of tolu, 1 in 10, with sucrose, alcohol (90 per cent.) and distilled water. One volume diluted with seven volumes of syrup yields a syrup of tolu which is more aromatic than Syrupus Tolutanus.

Syrupus Tolutanus, B.P.—(Syr. Tolu.)—Syrup of Tolu. *Syn.*—Syrup of Balsam of Tolu. It contains the active constituents of 2·5 per cent. w/w of balsam of tolu, with sucrose and distilled water. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms)

Tinctura Tolutana, B.P.—(Tinct. Tolu.)—Tincture of Tolu. *Syn.*—Tincture of Balsam of Tolu. Balsam of tolu, 10 per cent. w/v, in alcohol (90 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

BAPTISIA
(Baptis.)

Baptisia

Synonym—Wild Indigo Root.

Baptisia consists of the dried root of *Baptisia tinctoria* R. Br. (Fam. Leguminosæ), indigenous to Canada and the United States of America. It is collected in the autumn.

The root shows a branched, knotty crown, marked by stem-scars and measuring over all from about 4 to 8 centimetres. To the crown are attached a few sub-cylindrical and slightly tapering roots from about 0·5 to 1·5 centimetres thick and up to about 40 centimetres long. Externally, the drug is brown and longitudinally wrinkled, the older pieces being somewhat warty and scaly, and bearing a few long, wiry, branching rootlets. The fracture is fibrous and the smoothed transverse surface exhibits a thick, greyish-white bark, which easily separates from the yellowish-white, radiate, porous wood. The odour is slight, and the taste of the bark is bitter and slightly acrid.

The diagnostic **microscopical** characters are the numerous starch grains, simple or compound with 2 to 4 components, individual grains being up to 16 microns in diameter; numerous pitted vessels, up to 90 microns wide, from the xylem; the thick-walled, more or less lignified phloem fibres; groups of starch-bearing parenchyma; the cork cells with brownish and slightly lignified walls.

Baptisia **contains** the alkaloid, cytisine, the glycosides, baptin and baptisin (about 6 per cent.), and a crystalline, purgative principle. The ash is about 2·5 per cent. and the acid-insoluble ash about 0·5 per cent.

Action and Uses.—Baptisia has laxative properties and has been administered as a decoction. The tincture is used in the preparation of Liquor Thymolis Compositus.

Preparation

Tinctura Baptisiæ, B.P.C.—(Tinct. Baptis.)—Tincture of Baptisia. 1 in 10.

BARBITONUM
(Barbiton.)
Barbitone

$C_8H_{12}O_3N_2 = 184{\cdot}1$

Synonym—Barbital.

Barbitone, or diethylmalonylurea, is 5:5-diethylbarbituric acid and may be prepared by the condensation of urea with ethyl diethylmalonate. It occurs as a white, odourless, crystalline powder, with a slightly bitter taste. The saturated aqueous solution has an acid reaction and on the addition of nitric acid followed by a few drops of Millon's reagent, a white, gelatinous precipitate is produced, which is soluble in excess of the reagent. When heated with solid sodium hydroxide or with a strong aqueous solution, barbitone is decomposed with evolution of ammonia. It is soluble in aqueous solutions of alkali hydroxides and carbonates, with formation of alkali derivatives.

Soluble in water (1 in about 170), boiling water (1 in 12), alcohol (1 in 8·5), ether, chloroform and acetone.

Standard, B.P.—Barbitone has a melting-point of 189° to 192°. Ash, not more than 0·05 per cent. It complies also with limit tests for readily carbonisable substances and for neutral and basic substances.

Action and Uses.—Barbitone is a hypnotic which is said to act only upon the central nervous system, and has been found especially suitable for use in nervous insomnia and in insomnia associated with cardiac disease. In ordinary doses it does not affect the medullary centres to an appreciable degree and, therefore, blood pressure and respiration are not influenced. Barbitone belongs to the group of indifferent hypnotics, which owe their action to their physical property of relative solubility in brain-lipoid and insolubility in water. It is excreted slowly, so that cumulation may occur; eight grains requires three or four days for complete excretion. Regular administration, like that of other cumulative drugs, leads to sudden poisonous symptoms, such as rash, sickness, headache and delirium. In acute poisoning, coma and all the symptoms of collapse may result, often with rise of temperature, and may be followed by broncho-pneumonia. The dose of 0·3 gramme (5 grains) is ordinarily sufficient; poisonous symptoms have been noticed even with doses of 0·6 gramme (10 grains). The bowels and kidneys should be functioning properly when barbitone is administered because it is excreted slowly. It should be given with caution in cardio-renal affections. Barbitone is of value in sea-sickness and has been given as a sedative before ether or chloroform anæsthesia.

Many derivatives of barbituric acid are used for the same purpose as barbitone, but, generally speaking, they are more powerful and, therefore, more potentially dangerous. These hypnotics in ordinary doses are of little use when sleeplessness is due to pain. In such cases they are generally combined with drugs such as amidopyrine and acetylsalicylic acid, which possess analgesic properties. Barbitone is best

administered in cachets, swallowed with a draught of hot liquid. In cases of **poisoning** by barbitone, which is generally the result of cumulation, the stomach should be washed out with warm water, strychnine in full doses, adrenaline, or pituitary (posterior lobe) extract injected hypodermically, and the usual means taken to combat collapse and ensure efficient respiration. If the coma is prolonged, food should be given by stomach tube, and dextrose-saline administered by the rectum. Lumbar or cisternal puncture, and drainage to remove the poison from the brain may be necessary, especially if pneumonia has commenced.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Preparation

Tabellæ Barbitoni et Amidopyrinæ, B.P.C.—(Tab. Barbiton. et Amidopyrin.)—Tablets of Barbitone and Amidopyrine. Each tablet contains 2 grains of barbitone and 4 grains of amidopyrine. Dose.– 1 tablet.

BARBITONUM SOLUBILE

(Barbiton. Solub.)

Soluble Barbitone

$C_8H_{11}O_3N_2Na = 206·1$

Synonyms—Soluble Barbital; Barbitone-Sodium.

Soluble barbitone is the monosodium derivative of barbitone and may be prepared by the interaction of barbitone and sodium hydroxide. It occurs as a white, odourless, crystalline powder with a bitter taste. The aqueous solution has an alkaline reaction and on the addition of dilute acids, barbitone is precipitated. Soluble barbitone should be **stored** in well-closed containers.

Soluble in water (1 in about 6); slightly soluble in alcohol (90 per cent.); insoluble in ether and chloroform.

Standard, B.P.—Soluble barbitone contains not less than 97 per cent. of $C_8H_{11}O_3N_2Na$. It complies also with limit tests for free barbitone and for neutral and basic substances.

Action and Uses.—Soluble barbitone has properties similar to those of barbitone, but its action is claimed to be more rapid owing to its greater solubility. For this reason, it has been **administered** rectally (1 in 20 solution) and hypodermically (1 in 10 solution). Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. In cases of **poisoning,** the procedure outlined under Barbitonum should be followed.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

BARII CARBONAS
(Barii Carb.)
Barium Carbonate
$BaCO_3 = 197{\cdot}4$

Barium carbonate exists in the natural state as the mineral witherite, and may be obtained by mixing aqueous solutions of barium nitrate or barium chloride and sodium carbonate. It occurs as a white, dense, soft powder which should be free from grittiness.

Insoluble in water and alcohol; completely soluble in dilute hydrochloric acid.

Action and Uses.—Barium carbonate is used for the destruction of rats and mice. It exerts a corrosive action upon the intestinal mucous membrane, and excites intense thirst so that the rodents search for water and finally leave infested buildings. From 1·5 to 2 grains of barium carbonate is sufficient to kill a rat. The bait should be freshly prepared; it can be made by mixing equal parts of barium carbonate and oatmeal, sweetening with a little sugar and making into a paste with tallow or dripping. Oil of anise is sometimes added as a flavouring agent. The bait should be laid out of the way of domestic animals. Barium carbonate is soluble in the gastric secretion and the chloride formed is a powerful poison. On no account should barium carbonate be administered for purposes of X-ray diagnosis. In cases of **poisoning** by barium salts, zinc sulphate may be given as an emetic, or the stomach pump used, followed by sodium sulphate in 1 ounce doses; warmth should be applied and stimulants given freely.

BARII CHLORIDUM.—Barium chloride, $BaCl_2,2H_2O$, may be prepared from barium carbonate or from witherite. It occurs in the form of colourless, trimetric plates or glistening scales, odourless, non-efflorescent and having an unpleasant, bitter, sharp saline taste. The aqueous solution is neutral. The chloride loses its water of crystallisation at 100°, but takes it up again in moist air. It is soluble in water (1 in 2·5), but insoluble in alcohol. Barium chloride has a marked stimulant action on all forms of muscle tissue and raises the blood pressure by constricting the vessels. It is a very powerful drug and very apt to cause poisoning, but has been given in doses of up to 2 grains. It is used principally as a chemical reagent.

BARII SULPHAS
(Barii Sulphas)
Barium Sulphate
$BaSO_4 = 233{\cdot}4$

Synonyms—Barium Sulphate (X-ray); Barii Sulphas Purificatus.

Barium sulphate may be prepared by double decomposition between a soluble barium salt and a soluble sulphate. The precipitate is washed free from soluble barium compounds and dried. It occurs as a heavy,

white, amorphous powder. The salt is slightly soluble in boiling hydrochloric acid, and on diluting and filtering the cold solution, the filtrate gives reactions both for barium and for sulphate. It is also slightly soluble in nitric acid and in solutions of many salts.

Insoluble in water.

Standard, B.P.—Barium sulphate loses, on drying at 110°, not more than 2 per cent. of its weight. Arsenic limit, 1 part per million. It complies also with limit tests for acid-soluble matter, soluble barium compounds, copper, lead, mercury, tin and zinc, acid or alkali, phosphate, and for sulphide, sulphite and thiosulphate.

Action and Uses.—Barium sulphate has replaced bismuth compounds in X-ray examination of the alimentary tract, and for the purpose of outlining granulation sinuses. It passes through the body unchanged. Since barium is the most poisonous of the alkaline-earth metals, it is essential that pure barium sulphate be used. When given by the mouth it is mixed with milk or a farinaceous food, and suitably flavoured and sweetened. For examination of the colon, X-ray photographs are taken when the barium meal reaches the large gut, or after an enema containing barium sulphate has been administered. The enema for this purpose may be prepared with barium sulphate, 8 ounces, arrowroot, ¾ ounce, compound powder of tragacanth, ¼ ounce, and water, sufficient to produce 60 fluid ounces. Barium sulphate, administered by the mouth, has been used in the treatment of ulcerative colitis; it acts as a protective to the inflamed ulcerated areas, and serves to check diarrhœa.

Preparation

Pulvis Barii Sulphatis Compositus, B.P.C.—(Pulv. Barii Sulphatis Co.)—Compound Powder of Barium Sulphate. *Syn.*—Barium Meal; Shadow Meal. It contains 75 per cent. of barium sulphate. Dose.– 120 to 240 grammes (4 to 8 ounces), mixed immediately before use with a sufficient quantity of boiling water poured directly on the powder.

BARYTA SULPHURATA

(Baryt. Sulphur.)

Sulphurated Baryta

Synonym—Barium Sulphide.

Sulphurated baryta is a mixture containing barium sulphide (BaS = 169·4) and barium sulphate and may be obtained by igniting a mixture of barium sulphate and carbon. It occurs as a greyish-white or yellow powder, the latter containing free sulphur. In moist air it becomes converted into barium carbonate and thiosulphate, hydrogen sulphide being evolved. On ignition in air, it is converted into barium sulphate. It should be **stored** in well-stoppered bottles.

Partially **soluble** in water with decomposition, yielding barium hydroxide and hydrosulphide.

Standard.—Sulphurated baryta contains not less than 60 per cent. of BaS.

Assay.—Mix about 1 gramme, accurately weighed, with 50 millilitres of boiling water, and titrate with ammoniacal zinc solution until no black or brown colour is obtained when a drop of the solution is added to a drop of alkaline lead indicator; each millilitre of the ammoniacal zinc solution is equivalent to 0·02 gramme of BaS.

Action and Uses.—Sulphurated baryta is employed **externally** as a depilatory, being usually mixed with an equal weight, or twice its weight, of starch, or a mixture of starch and zinc oxide, with or without powdered soap; the powder should be mixed with sufficient water to form a thin paste immediately before application; after five or ten minutes the application is scraped off, and the part washed with warm water. The skin is reddened, temporarily, by this treatment. Sulphurated baryta is very **poisonous** and on no account should be supplied when "Barii Sulph." is ordered for X-ray examinations, the innocuous Barii Sulphas being intended by such direction.

BASSIA
(Bassia)
Bassia

Synonyms—Mowrah; Mowra; Mahua; Illipe.

Bassia consists of the seeds of *Bassia latifolia* Roxb. from the Central Provinces, Chota Nagpur and Western India, *B. longifolia* Linn. from Hyderabad and Madras, and *B. butyracea* Roxb. (Fam. Sapotaceæ) from the sub-Himalayan districts.

The seeds of *B. latifolia* are about 2 to 4 centimetres long, 1 to 1·5 centimetres wide and 0·7 to 1·0 centimetre thick, the average weight of one seed being about 1·0 gramme. They are exalbuminous, elongated-ovoid, pointed at one end and rounded at the other. The testa is smooth, glossy, and cinnamon-brown in colour, except for one edge along which runs the wide, greyish hilum. The seeds of *B. longifolia* and *B. butyracea* closely resemble those of *B. latifolia*.

Bassia **contains** from 50 to 55 per cent. of fixed oil, which is semi-solid and pale yellow, with an unpleasant taste and a characteristic odour. After bleaching in the sun and air, the oil forms a food-stuff known as mowrah butter. The seeds also contain a poisonous saponin, mowrin, which is found in the cake after the expression of the oil. This cake, when powdered, is dark chocolate-brown in colour and is known as mowrah meal.

Uses.—The fixed oil expressed from the seeds is used in India as

an edible fat and, after hardening, which is easily effected, it is used in the manufacture of margarine and as a substitute for cocoa butter in chocolate. Mowrah cake is used in India as a substitute for soap, and as a fish-poison. Mowrah meal, in a very finely powdered condition, is used as a worm-killer, for which purpose it is sprinkled over the ground in the proportion of about 4 ounces to the square yard, and followed by thorough watering.

BEBERINÆ SULPHAS
(Beberin. Sulph.)
Beberine Sulphate

Synonym—Bebeerine Sulphate.

Beberine sulphate may be prepared from commercial beberine, a mixture of alkaloids obtained from Nectandræ Cortex (Bebeeru Bark) which is the bark from the stem of *Nectandra Rodiæi* Hook. (Fam. Lauraceæ), a tree indigenous to British Guiana. It is obtained from the mixed alkaloids by dissolving the latter in alcohol, neutralising the solution with dilute sulphuric acid, evaporating the liquid on a water-bath to a syrupy consistence, spreading this on glass plates, and scaling. It occurs in brown, translucent scales with a very bitter taste, and contains about 30 per cent. of beberine associated with other alkaloids and much colouring matter.

Soluble in water (about 1 in 1); sparingly soluble in alcohol.

Action and Uses.—Beberine sulphate is an aromatic bitter, and is used as a substitute for quinine because of its antipyretic and tonic properties. It has been given in dysmenorrhœa, menorrhagia and leucorrhœa. It is **administered** in solution in water, usually with a mineral acid, or in pills.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

BELA
(Bela)
Bael

Synonyms—Belæ Fructus; Bael Fruit; Indian Bael; Bengal Quince.

Bael consists of the fresh or dried, half-ripe fruit of cultivated trees of *Aegle Marmelos* Correa. (Fam. Rutaceæ), a tree indigenous to India. In India the pulp is used while fresh; the dried fruit is exported entire or in transverse slices or quarters.

The fruit is a sub-globose berry from 7 to 10 centimetres in diameter. Externally, it has a yellowish-brown, smooth, or slightly granular, hard rind, 2 to 3 millimetres thick, bearing a circular scar at the point of

attachment of the peduncle. When cut transversely the rind appears reddish and is seen to enclose from 10 to 15 carpels, each containing several oblong, flat, hairy seeds embedded in a pale reddish pulp, which usually adheres to the rind. The pulp becomes very hard on drying.

Bael **contains** mucilage and pectin in the pulp. Ripe fruits differ from the unripe in yielding the tannin reaction with ferric chloride solution and also in possessing a distinct aroma.

Substitutes.—Substitutes for bael occur at times, including mangosteen fruits, *Garcinia Mangostana* Linn. (Fam. Guttiferæ), which are distinguished by the darker rind, to which the pulp does not firmly adhere, and by the wedge-shaped radiate stigmas, and the wood apple, *Feronia elephantum* Correa. (Fam. Rutaceæ), which is five-lobed, one-celled, and has a rough exterior.

Action and Uses.—Bael is a mild astringent and is used in India as a popular remedy for diarrhœa and dysentery. The fresh pulp may be eaten, or the drug may be **administered** in the form of Extractum Belæ Liquidum. The use of the extract is not followed by constipation and is particularly suitable for children.

Preparation

Extractum Belæ Liquidum, B.P.C.—(Ext. Belæ Liq.)—Liquid Extract of Bael. 1 in 1. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

This liquid extract, prepared without the chloroform, was included in the British Pharmacopœia, 1914.

BELLADONNÆ FOLIUM

(Bellad. Fol.)

Belladonna Leaf

Synonym—Deadly Nightshade Leaf.

Belladonna leaf consists of the dried leaves and tops of *Atropa Belladonna* Linn. (Fam. Solanaceæ), collected when the plant is in flower. The plant is a tall, branching, herbaceous perennial, widely distributed over Central and Southern Europe and cultivated in England. It should be **stored** in a dry place.

The leaves are thin, brittle, and of a pale yellowish-green colour; they are alternate and upon the upper stems are arranged in pairs, each consisting of a larger and a smaller leaf. They are simple and have a short petiole up to about 4 centimetres long; the lamina is usually from 5 to 25 centimetres long and 2·5 to 12 centimetres broad, broadly ovate, with an entire margin and an acuminate apex; the surface is only slightly hairy and the lamina is somewhat decurrent down the petiole. The flowers are borne singly upon short, drooping pedicels arising in the axils of the pairs of leaves; the campanulate corolla is livid purple, about 2·5 centimetres long and 1·2 centimetres wide, and has 5 small reflexed lobes; there are 5 epipetalous stamens and a superior, bilocular ovary

with numerous ovules attached to an axile placenta. The fruit is a green to dark purplish-black berry containing numerous small, brown, reticulate seeds. The odour is slight, and the taste unpleasant and bitter.

The diagnostic **microscopical** characters are the epidermal cells with wavy radial walls and a striated cuticle; the cruciferous type of the stomata on both surfaces; the single layer of palisade parenchyma; the idioblasts of the mesophyll and stem parenchyma, containing microsphenoidal crystals of calcium oxalate; the perimedullary phloem of the midrib and of the stem; the large xylem vessels; the pericyclic and xylem fibres of the stem; the occasional trichomes of two kinds, uniseriate covering trichomes, and glandular trichomes of various forms.

Belladonna leaf **contains** the alkaloid hyoscyamine and possibly atropine, the total quantity present in dried leaves of good quality being about 0·4 to 1·0 per cent., the greater part of which is hyoscyamine. The leaves also contain β-methylæsculetin (scopoletin, chrysatropic acid), and it is possible that they may contain minute quantities of other alkaloids (belladonnine, etc.), but not in sufficient quantity to contribute to the physiological action. Further constituents are small amounts of the volatile bases, pyridine, N-methylpyrroline, N-methylpyrrolidine and a diamine with a pyrrol nucleus.

Substitutes and Adulterants.—The leaves of *Phytolacca decandra* Linn. and of other species of *Phytolacca* (Fam. Phytolaccaceæ), of *Scopolia carniolica* Jacq. (Fam. Solanaceæ) and of *Ailanthus glandulosa* Desf. (Fam. Simarubaceæ) occur at times as substitutes for belladonna leaf. They are best distinguished by their microscopical features; phytolacca leaves contain idioblasts with acicular raphides of calcium oxalate; scopolia leaves possess stomata on the under surface only and the idioblasts with microsphenoidal crystals of calcium oxalate are much fewer than in belladonna leaf, while the fruit, a nearly spherical pyxis, is usually present; ailanthus leaves have cluster-crystals of calcium oxalate near the veins.

Standard, B.P.—Belladonna leaf contains not more than 2 per cent. of foreign organic matter, not more than 20 per cent. of its stem and not more than 1 per cent. of its stem having a width greater than 5 millimetres, and not less than 0·3 per cent. of the alkaloids of belladonna leaf, calculated as hyoscyamine. Ash, not more than 15 per cent. Acid-insoluble ash, not more than 3 per cent.

Belladonna leaf, in powder, contains the constituents and possesses the diagnostic microscopical characters of Belladonnæ Folium, and complies with the limits for alkaloids, ash and acid-insoluble ash of the unground drug. When powdered belladonna leaf is prescribed, the standardised powder, Belladonna Pulverata, must be used.

Action and Uses.—Preparations of belladonna are used to check excessive secretion and to allay inflammation, particularly in secretory glands. The drug is a powerful anti-spasmodic in intestinal colic and in spasmodic asthma; given with purgatives, it depresses the inhibitory nerves of the intestines and allays griping. Belladonna is well tolerated by children and is given in large doses in whooping cough, urinary incontinence and false croup. For its action on the circulation it is given in the collapse of pneumonia, typhoid fever, and other acute

diseases. It is of value in acute sore throat and relieves local inflammation and congestion. Belladonna decreases gastric secretion and when this action is desired it should not be given just before or after meals. The glycerin of belladonna or the plaster is applied externally to allay pain, and as an antigalactagogue.

Belladonna leaf is **administered** as Belladonna Pulverata, but is used principally in the form of dry extract and green extract and, in mixtures, in the form of tincture. Occasionally the leaves are employed as an ingredient of cigarettes for spasmodic asthma, but their use should not be encouraged. Extractum Belladonnæ Viride is commonly prescribed with purgatives in pill form, to diminish their tendency to cause griping, with camphor and quinine for nasal catarrh and with camphor or the valerianates as a sedative. For external use, the green extract is softened with warm water and spread upon leather for local application, or used in the form of Glycerinum Belladonnæ to allay pain or arrest glandular secretion. The green extract is sometimes specified for use in suppositories; it must be rubbed to a smooth consistence with a few drops of warm water before mixing with the melted fat; excess of heat separates the chlorophyll. In cases of **poisoning** by belladonna or by the alkaloids of belladonna the procedure described under Atropina should be followed.

Preparations

Belladonna Pulverata, B.P.—(Bellad. Pulverat.)—Powdered Belladonna Leaf. *Syn.*—Pulvis Belladonnæ. Belladonna leaf reduced to fine powder and adjusted with exhausted belladonna leaf to contain 0·3 per cent. of alkaloids, calculated as hyoscyamine (limits, 0·28 to 0·32). Ash, not more than 15 per cent. 0·2 gramme contains about 0·0006 gramme, and 3 grains contains about $\frac{1}{100}$ grain of alkaloids. Dose.– 0·03 to 0·2 gramme ($\frac{1}{2}$ to 3 grains).

Pulvis Belladonnæ I.A. is adjusted with rice starch to contain 0·3 per cent. of total alkaloids.

Emplastrum Belladonnæ Viride, B.P.C.—(Emp. Bellad. Vir.)—Green Belladonna Plaster. It contains dry extract of belladonna equivalent to 0·25 per cent. of the alkaloids of belladonna leaf, with chlorophyll and rubber adhesive plaster.

Extractum Belladonnæ Siccum, B.P.—(Ext. Bellad. Sicc.)—Dry Extract of Belladonna. It is prepared with alcohol (70 per cent.) and adjusted with belladonna leaf in fine powder to contain 1 per cent. of the alkaloids of belladonna leaf, calculated as hyoscyamine (limits, 0·95 to 1·05); 0·06 gramme contains about 0·0006 gramme and 1 grain contains about $\frac{1}{1000}$ grain of alkaloids. It should be stored in small, wide-mouthed, well-closed containers in a cool place. Dose.– 0·015 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

Extractum Belladonnæ I.A. is prepared with alcohol (70 per cent.), evaporation being conducted at temperatures below 50°, and contains not less than 1·3 per cent. of total alkaloids.

Extractum Belladonnæ Viride, B.P.C.—(Ext. Bellad. Vir.)—Green Extract of Belladonna. A soft extract containing from 0·95 to 1·05 per cent. of the alkaloids of belladonna, calculated as hyoscyamine; 0·06 gramme contains about 0·0006 gramme, and 1 grain contains about $\frac{1}{100}$ grain of alkaloids. Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

Green extract of belladonna replaces the unstandardised Extractum Belladonnæ Viride, B.P. 1898.

Glycerinum Belladonnæ, B.P.C.—(Glycer. Bellad.)—Glycerin of Belladonna. Green extract of belladonna, 1 in 2 w/w, with distilled water and glycerin.

Tinctura Belladonnæ, B.P.—(Tinct. Bellad.)—Tincture of Belladonna. It is prepared by percolation with alcohol (70 per cent.) and contains 0·03 per cent. w/v of the alkaloids of belladonna leaf, calculated as hyoscyamine (limits, 0·028 to 0·032); 2 millilitres contains 0·0006 gramme and 30 minims contains about $\frac{1}{100}$ grain of alkaloids. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Tinctura Belladonnæ I.A. is prepared with alcohol (70 per cent.) and contains not less than 0·03 per cent. of total alkaloids. Sirupus Belladonnæ I.A. contains 5 per cent. of Tinctura Belladonnæ I.A.

BELLADONNÆ RADIX

(Bellad. Rad.)

Belladonna Root

Belladonna root is the dried root of *Atropa Belladonna* Linn. (Fam. Solanaceæ), a large, branching, herbaceous perennial, growing freely upon calcareous soils throughout Central and Southern Europe, and cultivated in England. The root is collected in the autumn when about three to four years old, the larger roots being divided longitudinally.

The root is simple or occasionally branched; it is sub-cylindrical, and occurs entire or longitudinally split, the pieces being about 10 to 30 centimetres long and up to about 4 centimetres wide at the crown. Externally it is covered with a thin, pale, greyish-brown, longitudinally wrinkled cork, and breaks with a short fracture. The smoothed, transversely cut surface is whitish to brownish in colour and shows a dark cambium line separating a narrow bark, which is devoid of fibres, from a parenchymatous xylem containing scattered groups of vessels, which are more numerous and inconspicuously radiate just within the cambium. The crown of the root shows a central pith and a markedly radiate xylem.

The diagnostic **microscopical** characters are the abundant parenchyma containing starch in simple and occasional compound grains, 15 to 20 or up to 30 microns in diameter; the idioblasts containing microsphenoidal crystals of calcium oxalate; the large vessels with closely arranged bordered pits; thin-walled xylem fibres; patches of cork cells; the absence of phloem fibres and stone cells.

Belladonna root **contains** the alkaloids hyoscyamine and atropine. Hyoscyamine exists in the larger proportion and it is doubtful whether the crude drug contains atropine, it being probable that in the process of extraction part of the hyoscyamine is converted into atropine. Traces of hyoscine are also said to be present, as well as the crystalline, fluorescent substance, β-methylæsculetin. The total amount of alkaloid in the root varies from about 0·3 to 0·8 per cent.

Substitutes and Adulterants.—Indian belladonna root, collected in Kashmir, has been referred to *A. lutescens* Jacq. Some of the belladonna root produced

in India is obtained from *A. Belladonna* Linn. Poke root (see Phytolacca) is sometimes substituted for belladonna and may be detected by its characteristic structure and, in powder, by the presence of acicular raphides. Scopolia has also occurred as a substitute and can be recognised by the characters given under Scopolia.

Standard, B.P.—Belladonna root contains not more than 4 per cent. of foreign organic matter and not less than 0·4 per cent. of the alkaloids of belladonna root, calculated as hyoscyamine. Acid-insoluble ash, not more than 4 per cent.

Belladonna root, in powder (Pulvis Belladonnæ Radicis : Pulv. Bellad. Rad.), contains the constituents and possesses the diagnostic microscopical characters of Belladonnæ Radix, and complies with the limits for alkaloids and acid-insoluble ash of the unground drug.

Action and Uses.—The properties of belladonna root are essentially those of belladonna leaf, but the root is used chiefly for preparations for external application. Collodium Belladonnæ is especially suitable for painting over joints, or whenever a plaster cannot conveniently be employed. Emplastrum Belladonnæ relieves pain and diminishes secretion; it is applied in intercostal neuralgia, lumbago, and to relieve the pain due to adhesions following pleurisy. It is also applied to the cardiac region to relieve pain and palpitation. Belladonna plasters of suitable shape applied to the breast are said to decrease the secretion of milk, but there is reason to believe that non-medicated plasters would have the same effect. Cases of poisoning by absorption have arisen owing to the use of belladonna plaster over too large a surface. Linimentum Belladonnæ is used as an anodyne application for lumbago, neuralgia, and rheumatic pains. Linimentum Belladonnæ cum Chloroformo is specially suitable for close application to the skin on flannel or piline to relieve neuralgic pain. Unguentum Belladonnæ is applied over neuralgic areas to relieve pain; it is also applied to the anus in fissure to relieve pain and muscular spasm. In cases of **poisoning** the procedure described under Atropina should be followed.

Dose.– 0·03 to 0·12 gramme ($\frac{1}{2}$ to 2 grains).

Preparations

Chloroformum Belladonnæ, B.P.C.—(Chlorof. Bellad.)—Chloroform of Belladonna. Liquid extract of belladonna, 1 in 2.

Collodium Belladonnæ, B.P.C.—(Collod. Bellad.)—Belladonna Collodion. *Syn.*—Emplastrum Belladonnæ Fluidum; Liquid Belladonna Plaster. Liquid extract of belladonna, 1 in 2, and camphor, about 1 in 60, in a collodion basis.

Emplastrum Belladonnæ, B.P.—(Emp. Bellad.)—Plaster of Belladonna. *Syn.*—Belladonna Plaster. Plaster of colophony mixed with a sufficient quantity of a soft alcoholic extract of belladonna root to produce a plaster containing approximately 0·25 per cent. of the alkaloids of belladonna root. A spread belladonna plaster containing the same proportion of alkaloid may be made with a rubber basis.

Extractum Belladonnæ Liquidum, B.P.—(Ext. Bellad. Liq.)—Liquid Extract of Belladonna. It is prepared with a mixture of 7 volumes of alcohol (90 per cent.) and 1 volume of distilled water and adjusted to contain 0·75 per cent. w/v of the alkaloids of belladonna root, calculated as hyoscyamine (limits, 0·70 to 0·80); 0·06 millilitre contains 0·00045 gramme and 1 minim contains about $\frac{1}{150}$ grain of alkaloids. **Dose.**– 0·015 to 0·06 millilitre ($\frac{1}{4}$ to 1 minim).

Linimentum Aconiti Oleosum, B.P.C.—(Lin. Aconit. Oleos.)—Liniment of Aconite with Oil. *Syn.*—A.B.C. Liniment. Equal parts of liniments of aconite, belladonna and chloroform. (The non-oily liniment of the British Pharmaceutical Codex, 1923 is included under the name of Pigmentum Aconiti Compositum.)

Linimentum Belladonnæ, B.P.—(Lin. Bellad.)—Liniment of Belladonna. An alcoholic extract of belladonna root prepared with a mixture of 7 volumes of alcohol (90 per cent.), or industrial methylated spirit suitably diluted, and one volume of distilled water, the product being adjusted to contain 0·375 per cent. w/v of the alkaloids of belladonna root (limits, 0·350 to 0·400), with 5 per cent. w/v of camphor.

Linimentum Belladonnæ cum Chloroformo, B.P.C.—(Lin. Bellad. c. Chlorof.)—Liniment of Belladonna with Chloroform. Chloroform, 1 in 8, with liniment of belladonna

Pigmentum Aconiti Compositum, B.P.C.—(Pig. Aconit. Co.)—Compound Aconite Paint. Liniment of aconite and liniment of belladonna, of each 37·5 per cent. v/v, with chloroform and distilled water.

Suppositorium Belladonnæ, B.P.—(Supp. Bellad.)—Belladonna Suppository. Each suppository contains 0·15 millilitre (2½ minims) of liquid extract of belladonna, equivalent to about 0·001 gramme ($\frac{1}{60}$ grain) of the alkaloids of belladonna root.

Unguentum Belladonnæ, B.P.C.—(Ung. Bellad.)—Belladonna Ointment. Liquid extract of belladonna, 80 per cent. v/w, evaporated and mixed with wool fat and benzoinated lard; it contains about 0·6 per cent. of the alkaloids of belladonna root.

This ointment was included in the British Pharmacopœia, 1914.

Unguentum Belladonnæ I.A. contains 10 per cent. of Extractum Belladonnæ I.A.

BENZALDEHYDUM

(Benzaldehyd.)

Benzaldehyde

$C_7H_6O = 106·0$

Benzaldehyde, $C_6H_5 \cdot CHO$, may be obtained by the catalytic oxidation of toluene by manganese dioxide in the presence of sulphuric acid, or by the hydrolysis of benzal chloride with calcium hydroxide. It occurs as a colourless or slightly yellow, aromatic liquid, with an odour of bitter almond. It solidifies at about 26° and boils at about 180°. The liquid is strongly refractive. On exposure to the air it is oxidised to benzoic acid. It gives the usual reactions for aldehydes, but does not reduce Fehling's solution. Benzaldehyde should be **stored** in small, stoppered bottles, protected from light and air.

Soluble in water (1 in about 350); readily miscible with alcohol, ether, and fixed or volatile oils.

Standard.—Benzaldehyde contains not less than 90 per cent. of C_7H_6O. Specific gravity, 1·049 to 1·053. Refractive index at 20°, 1·554 to 1·556. A mixture of 0·5 millilitre of benzaldehyde, 5 millilitres of water, 0·5 millilitre of sodium hydroxide solution and 0·1 millilitre of ferrous sulphate solution does not produce, on the addition

of excess of hydrochloric acid, a greenish-blue colouration or blue precipitate within fifteen minutes (absence of hydrocyanic acid). Mix 1 millilitre of benzaldehyde with 20 millilitres of alcohol and dilute with water until separation commences; add 5 grammes of zinc and 10 millilitres of dilute sulphuric acid and allow the action to proceed for one hour; filter, evaporate the filtrate to about 20 millilitres and boil with 1 millilitre of N/10 potassium dichromate; no violet colour is produced (absence of nitrobenzene). Take 40 millilitres of concentrated sulphuric acid in a stoppered retort, the beak of which dips beneath the surface of 10 millilitres of N/10 silver nitrate; to the sulphuric acid add 1 gramme of benzaldehyde, mix and add 10 millilitres of nitric acid; warm cautiously until frothing ceases and nitrous fumes are no longer evolved, increase the heat and continue the distillation for thirty minutes; add 1 millilitre of nitric acid to the distillate and boil until colourless; the precipitate, if any, weighs not more than 0·0004 gramme (limit of chlorinated compounds). 5 grammes of benzaldehyde dissolved in neutral alcohol (90 per cent.) requires not more than 4·1 millilitres of N/2 alcoholic potassium hydroxide for neutralisation to phenolphthalein (limit of benzoic acid).

Assay.—Weigh accurately into a stoppered tube about 0·5 gramme of benzaldehyde. Add 20 millilitres of N/2 hydroxylamine hydrochloride and titrate with N/2 alcoholic potassium hydroxide using methyl orange as indicator. From the volume required deduct the volume of alkali required for the free benzoic acid present; each millilitre of N/2 alcoholic potassium hydroxide is equivalent to 0·05326 gramme of C_7H_6O, which allows for the correcting factor for methyl orange.

Uses.—Benzaldehyde is used as a flavouring agent, and is sometimes sold as artificial or synthetic oil of bitter almond.

ALCOHOL PHENYLÆTHYLICUM.—Phenylethyl alcohol, $C_6H_5 \cdot CH_2 \cdot CH_2 OH$, is present in oil of rose and other essential oils and may be obtained synthetically from phenylacetic esters. It occurs as a colourless liquid with a rose-like odour and is used in perfumery.

PHENYLACETALDEHYDUM.—Phenylacetaldehyde, $C_6H_5 \cdot CH_2 \cdot CHO$, may be prepared synthetically from cinnamic acid and occurs as a colourless, viscous oil with a powerful, hyacinth-like odour, a specific gravity of about 1·050 to 1·085 and a boiling-point of about 207°. It is used in perfumery.

BENZAMINÆ HYDROCHLORIDUM

(Benzamin. Hydrochlor.)

Benzamine Hydrochloride

$C_{15}H_{21}O_2N,HCl = 283·6$

Synonym—Betacaine Hydrochloride.

Benzamine hydrochloride is the hydrochloride of the synthetic base, 4-benzoyloxy-2 : 2 : 6-trimethylpiperidine. It occurs as a white,

crystalline powder which is odourless and possesses a slightly bitter taste followed by a sensation of numbness. 0·1 gramme dissolves in 1 millilitre of cold sulphuric acid forming a colourless solution, which, when kept at 100° for five minutes and then cautiously diluted with 2 millilitres of water, develops an aromatic odour, and on cooling deposits crystals of benzoic acid. It gives the reactions of chlorides. A mixture of 0·05 gramme of benzamine hydrochloride with 0·25 gramme of mercurous chloride does not blacken when moistened with water or alcohol (distinction from cocaine hydrochloride). No permanent precipitate is produced by the addition of 5 millilitres of mercuric chloride solution, or 5 millilitres of potassium iodide solution, to separate 5 millilitre portions of a 1 per cent. w/v solution of benzamine hydrochloride (distinction from cocaine and alphacaine respectively).

Soluble in water (1 in 30), alcohol (1 in 35) and chloroform (1 in 6 at 25°).

Standard.—Benzamine hydrochloride melts at approximately 268°, with decomposition. Loss on drying at 100°, not more than 1 per cent. Ash, not more than 0·1 per cent. The aqueous solution (1 in 50) is bright, colourless, and neutral to litmus paper.

Action and Uses.—Benzamine hydrochloride was one of the first important synthetic substitutes for cocaine. It is a local anæsthetic possessing an action and toxicity less than those of cocaine. In excretion this drug differs from cocaine in that it is rapidly destroyed by the liver, none being excreted in the urine. In producing anæsthesia care must be exercised that the solution does not enter a vein. Unlike cocaine it does not dilate the pupil; it is, however, much inferior to this alkaloid when applied to the conjunctiva. It does not constrict blood vessels, but on the contrary produces hyperæmia.

The chief objection to the use of benzamine hydrochloride is that it is intensely irritating and has a devitalising action on the tissues. Solutions containing 0·1 to 2 per cent. w/v in physiological sodium chloride solution are used subcutaneously. Solutions for **injection** may be sterilised by tyndallisation, by filtration, or by boiling for thirty minutes. The quantity of solution used varies according to the purpose for which it is required. A total of 3 to 5 grains has been given with safety. It is **incompatible** with salicylic acid. To prevent poisoning by benzamine, soluble barbitone, 7½ grains, given by the mouth an hour before the operation, is a valuable measure. In cases of **poisoning** by benzamine, strong coffee, alcohol and strychnine should be given, together with oxygen and artificial respiration if the occasion demands.

Dose.– 0·008 to 0·03 gramme (⅛ to ½ grain).

Preparation

Solvellæ Boracis et Benzaminæ Compositæ, B.P.C.—(Solv. Borac. et Benzamin. Co.)—Compound Solution-Tablets of Borax and Benzamine. *Syn.*—Naso-Pharyngeal Solution-Tablets. Each tablet contains 5 grains of sodium chloride, 3 grains of borax, 1 grain of boric acid, ½ grain of sodium benzoate and ½ grain of benzamine hydrochloride, with menthol, thymol and oil of sweet birch.

BENZAMINÆ LACTAS
(Benzamin. Lact.)

Benzamine Lactate

$C_{15}H_{21}O_2N,C_3H_6O_3 = 337{\cdot}2$

Synonym—Betacaine Lactate.

Benzamine lactate is the lactate of the synthetic base, 4-benzoyloxy-2 : 2 : 6-trimethylpiperidine It occurs as a white, crystalline powder, which is odourless and possesses a slightly bitter taste followed by a sensation of numbness. It gives the reaction for benzamine described under benzamine hydrochloride. The tests for distinction from cocaine and alphacaine given under benzamine hydrochloride are also applicable to the lactate.

Soluble in water (1 in 5) and alcohol (1 in 8).

Standard.—Benzamine lactate melts between 152° and 156°. Loss on drying at 100°, not more than 1 per cent. Ash, not more than 0·1 per cent. Solutions of the salt in water are neutral or only faintly alkaline to litmus paper and, in the presence of nitric acid, give no reaction for chlorides or sulphates.

Action and Uses.—Benzamine lactate has an action and toxicity similar to those of benzamine hydrochloride. On account of its ready solubility and the permanence of its solution it is preferable to the hydrochloride when a strong solution is required. Infiltration of localised tender areas is a valuable measure in lumbago and neuralgia. It is not much used in ophthalmic surgery. Solutions of the following strengths may be employed: in dental surgery, 2 per cent. w/v; for infiltration anæsthesia, 0·1 per cent. w/v in normal saline; for regional anæsthesia, 1 to 2 per cent. w/v; for the urethra, 2 per cent. w/v; for the nose, throat and ear, 10 per cent. w/v, as a spray. It is **incompatible** with salicylic acid. Solutions for **injection** may be sterilised by tyndallisation, by filtration, or by boiling for thirty minutes. In cases of **poisoning** the procedure described under Benzaminæ Hydrochloridum should be adopted.

Dose.– 0·008 to 0·03 gramme ($\frac{1}{8}$ to $\frac{1}{2}$ grain).

BENZENUM
(Benzen.)

Benzene

$C_6H_6 = 78{\cdot}05$

Synonym—Crystallisable Benzene.

Benzene is a hydrocarbon obtained by the fractional distillation of the light oil of coal tar. It is a colourless, mobile liquid, free from

opalescence and having a characteristic odour. The liquid is very inflammable and burns with a luminous, smoky flame. Its flash-point is about 8°. Commercial benzene usually contains small quantities of thiophene and gives a brown colouration when shaken with sulphuric acid, and a blue or green colour is produced on adding a crystal of isatin and further shaking. The thiophene may be removed by shaking the benzene with several small successive quantities of sulphuric acid, washing and rectifying the product; it is then known as "thiophene free." Benzene must be distinguished from benzol, a mixture of aromatic hydrocarbons, and from benzine, one of the many commercial forms of petroleum spirit. A mixture of 9 volumes of carbon tetrachloride and 1 volume of benzene is often referred to as "non-inflammable benzene."

Insoluble in water; miscible with alcohol, ether, acetone, glacial acetic acid and fixed or volatile oils.

Standard.—Benzene solidifies when cooled to 0°, and does not entirely re-melt below 4°. Not less than 95 per cent. w/w distils between 79° and 82°. Specific gravity, 0·880 to 0·887. Residue, when volatilised at 100°, not more than 0·01 per cent. w/v.

Action and Uses.—Benzene possesses the property of reducing the number of leucocytes in the blood, probably by its toxic action on the bone marrow and lymphoid tissue, and has been used in the treatment of the leukæmias. As the action is prolonged, treatment should be carefully controlled by frequent white cell counts and the drug withdrawn before the leucocyte count falls to normal. Owing to its volatile nature the most rapid absorption of benzene occurs when the vapour is inhaled, but for therapeutic purposes the liquid is usually used. It may be **administered** in capsules or as an emulsion by the mouth, or hypodermically as a solution in oil. By either route absorption is very slow, and when taken by the mouth a high proportion escapes by the bowel. The absorbed benzene is excreted in part unchanged by the lungs, and the remainder is slowly oxidised to phenols and other hydroxyl derivatives which appear in the urine in combination as sulphonates and glycuronates. Benzene is a parasiticide and is used as an application for the destruction of pediculi in the head and pubic region, either undiluted or mixed with ten times its volume of soap solution. It is useful in the treatment of seborrhœa, being applied to the skin or brushed into the scalp. It can be employed to prevent bacterial decomposition of organic solutions, but toluene is more suitable for this purpose. The effects of acute **poisoning** by benzene are chiefly confined to the central nervous system; small quantities produce headache, dizziness, and nausea, and larger amounts convulsions and unconsciousness. Treatment consists in washing out the stomach if benzene has been swallowed, and the administration of stimulants and oxygen; if necessary, artificial respiration should be employed. Chronic poisoning is characterised by a marked diminution in the leucocytes, particularly of the polymorphonuclear cells, by

degenerative changes in the liver and kidneys, and by a progressive anæmia.

Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

BENZOL.—Benzol is a mixture of aromatic hydrocarbons obtained from light coal tar oil, and contains about 70 per cent. of benzene C_6H_6, together with 20 to 30 per cent. of toluene, $C_6H_3CH_3$. It is a clear, colourless, mobile liquid, with a strong characteristic odour; specific gravity, 0·880 to 0·888. There are various grades of benzol in commerce, designated according to the amount of distillate obtainable under 100°, the percentage referring to this fact, and not to the amount of any particular constituent. Thus, liquids described as 90 per cent. benzol, 50 per cent. benzol and 30 per cent. benzol, are mixtures of benzene with hydrocarbons of higher boiling-point, and the percentage indicates the proportion that will distil below 100°. Benzol is used chiefly as a solvent, and for cleaning purposes.

CYCLOHEXANUM.—Cyclohexane, hexamethylene, or hexahydrobenzene, C_6H_{12}, may be obtained by the catalytic hydrogenation of benzene and occurs as a colourless, mobile liquid having a less pungent odour than that of benzene. It has a specific gravity of about 0·778 to 0·790 and a boiling-point of 81°. It is less toxic than benzene and is sometimes used instead of it.

BENZOCAINA
(Benzocain.)

Benzocaine

$C_9H_{11}O_2N = 165·1$

Synonym—Ethyl Aminobenzoate.

Benzocaine is ethyl *p*-aminobenzoate, $NH_2·C_6H_4·COOC_2H_5$, and may be prepared from *p*-nitrotoluene by oxidation to *p*-nitrobenzoic acid, reduction to *p*-aminobenzoic acid and subsequent esterification with ethyl alcohol. It occurs as a white, odourless, crystalline powder with a slightly bitter taste followed by a sensation of numbness. The aqueous or alcoholic solution is neutral to litmus and it may be extracted from solutions in dilute acids by shaking with ether. When one or two drops of sodium nitrite solution, followed by one or two drops of a solution of betanaphthol in sodium hydroxide solution, are added to 1 millilitre of a 1 per cent. solution in water containing a trace of hydrochloric acid, a deep red colour is produced followed, on standing, by a scarlet precipitate.

Benzocaine may be distinguished from orthocaine by the formation of a precipitate on the addition of iodine solution to a 1 in 50 solution of benzocaine in water acidified with dilute hydrochloric acid; it may be distinguished from amylocaine hydrochloride and from procaine hydrochloride by the fact that these give a precipitate on the addition of potassio-mercuric iodide solution while benzocaine yields no precipitate. It should be **stored** in well-closed containers, protected from light.

Slightly **soluble** in water (about 1 in 2500), alcohol (90 per cent.) (1 in 8), ether (1 in 4), chloroform (1 in 2), almond oil (1 in 50) and olive oil (1 in 35).

Standard, B.P.—Benzocaine has a melting-point of 90° to 91°. Ash, not more than 0·1 per cent. It complies also with limit tests for readily carbonisable substances and free acid.

Action and Uses.—Benzocaine is a local anæsthetic employed mainly for dusting on mucous or ulcerated surfaces. It may be given by the mouth to relieve the pain of gastric carcinoma and is of value as an insufflation, or as a 2 per cent. w/v solution in equal parts of alcohol and water, in tuberculous laryngitis. In combination with atropine and soft paraffin, it is used as an application to sensitive areas in the nose in cases of asthma, or in conjunction with adrenaline in hay fever. Bougies, suppositories and pessaries may be prepared containing 5 grains in each. Externally, benzocaine may be applied to burns and cancerous ulcerations, and is of value in intractable pruritus. It is used as a dusting powder in combination with starch or purified talc, 10 to 50 per cent., or as an ointment with hydrous wool fat, 5 to 10 per cent. It is best **administered** internally in cachets. Solutions of benzocaine in oil for **injection** may be prepared by dissolving the benzocaine in olive oil or almond oil which has been sterilised by heating at 150° for one hour and allowed to cool. The final container is sterilised by heating at 100° for thirty minutes.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

BENZOINUM

(Benzoin.)

Benzoin

Synonym—Gum Benzoin.

Benzoin is a balsamic resin obtained from *Styrax Benzoin* Dryand. (Fam. Styraceæ), and is known in commerce as Sumatra benzoin. Normally the tree does not produce benzoin; the formation of oleoresin ducts is induced by hacking the trunk sufficiently deeply to injure the cambium, and after a time the liquid benzoin either accumulates beneath the bark or exudes from the incisions. The exudation is allowed to harden and is exported in blocks.

Benzoin occurs in hard, brittle masses consisting of whitish or reddish tears compacted together by a resinous matrix and varying in colour from greyish-brown to reddish-brown. It has an agreeable, balsamic odour and a slightly acrid taste. When benzoin is heated in a dry tube, irritating whitish fumes are evolved, and a sublimate consisting chiefly of cinnamic acid collects in the cooler portions of the tube. On warming benzoin with potassium permanganate solution an odour of benzaldehyde is produced.

Benzoin **contains** various esters of benzoic and cinnamic acids, together with the free acids. The chief alcohols present in combination are benzoresinol and coniferyl alcohol and its oxidation products. The

proportion of total cinnamic acid averages approximately double that of the total benzoic acid.

Substitutes.—Other varieties of benzoin occur in commerce, the chief of which is Siam benzoin. This is collected in the Siamese province of Luang Prabang, but the tree which yields it has not been definitely identified; it has been referred to *Styrax Tonkinense* Craib. It is sent to the market either as tears or masses. The tears are flattened or curved and attain as much as 5 centimetres in length and 12 millimetres in thickness; externally they are reddish-yellow, but internally milky-white. Lump or block Siam benzoin consists of tears cemented together with a comparatively large proportion of transparent, reddish-brown resin. Both kinds contain benzoic acid but no cinnamic acid, and have an odour recalling that of vanilla. Penang or "glassy Penang" benzoin comes from Sumatra; it has a greyish, vitreous appearance and no aromatic odour. Palembang benzoin also comes from Sumatra; it consists of a reddish, resinous mass in which are embedded a few scattered tears and has but a slight odour.

Standard, B.P.—Benzoin contains not less than 19 per cent. and not more than 29 per cent. of free balsamic acids, and not less than 30 per cent. and not more than 60 per cent. of total balsamic acids, both calculated on the dry, alcohol-soluble matter. Residue, after continuous extraction with alcohol (90 per cent.) and drying at 100°, not more than 20 per cent. Loss on drying in a vacuum over sulphuric acid, not more than 10 per cent. Acid value, 115 to 163; ester value, 47 to 83; saponification value, 169 to 223, all calculated with reference to the dry, alcohol-soluble matter. Ash, not more than 2 per cent.

Action and Uses.—Benzoin is carminative and antiseptic. It is rapidly absorbed and, during excretion, is mildly expectorant, diuretic, and antiseptic to the urinary passages. It is usually **administered** as Tinctura Benzoini Composita, which is used as an antiseptic and styptic dressing for small cuts by applying it undiluted, and is given internally in chronic bronchitis. When mixed with water, the resinous constituents of compound tincture of benzoin are best suspended with a mixture of equal parts of mucilage of acacia and mucilage of tragacanth, the amount of mucilage used being one-eighth of the volume of the mixture. Benzoin is used externally, in the form of Tinctura Benzoini diluted with water, as a mild stimulant and antiseptic in irritable conditions of the skin. It is a preservative of fats otherwise liable to become rancid, and is therefore used in the preparation of benzoinated lard. Nebula Benzoini Composita is used in a nebuliser as a spray to the nose and throat in catarrhal affections of the respiratory passages.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

Preparations

Collodium Stypticum, B.P.C.—(Collod. Stypt.)—Styptic Collodion. Tannic acid, about 1 in 6½, with benzoin, alcohol and simple collodion.

Lotio Benzoini, B.P.C.—(Lot. Benzoin.)—Lotion of Benzoin. *Syn.*—Lait Virginal. Tincture of benzoin, 1 in 40, with rose water.

Nebula Benzoini Composita, B.P.C.—(Neb. Benzoin. Co.)—Compound Benzoin Spray. Oil of pumilio pine, about 1 in 66, and menthol, 1 in 100, with oils of eucalyptus and cassia, in glycerin and tincture of benzoin.

Tinctura Benzoini, B.P.C.—(Tinct. Benzoin.)—Tincture of Benzoin. *Syn.*—Simple Tincture of Benzoin. 1 in 10. Dose.—2 to 4 millilitres (½ to 1 fluid drachm).

Tinctura Benzoini Composita, B.P.—(Tinct Benzoin. Co.)—Compound Tincture of Benzoin. *Syn.*—Friars' Balsam. Benzoin, 10 per cent. w/v, storax, balsam of tolu and aloes, macerated in alcohol (90 per cent.). Dose.—2 to 4 millilitres (½ to 1 fluid drachm).

Unguentum Zinci cum Benzoino, B.P.C.—(Ung. Zinc. c. Benzoin.)—Ointment of Zinc Oxide with Benzoin. Compound tincture of benzoin, about 12·5 per cent. v/w, in ointment of zinc oxide.

BENZYLIS BENZOAS

(Benzyl. Benz.)

Benzyl Benzoate

$C_{14}H_{12}O_2 = 212{\cdot}1$

Benzyl benzoate, $C_6H_5{\cdot}COOCH_2\,C_6H_5$, may be prepared by the action of benzoic acid on benzyl alcohol in the presence of a small quantity of sulphuric acid. It occurs as a white, crystalline solid having a faint, aromatic odour and a sharp, burning taste. It is neutral to litmus. The solution obtained by saponifying benzyl benzoate with alcoholic solution of potassium hydroxide, evaporating, dissolving in water and then neutralising, produces a buff-coloured precipitate with ferric chloride solution; with excess of hydrochloric acid a white, crystalline precipitate of benzoic acid is produced. It melts at 20° to a colourless, oily, neutral liquid which is very liable to become supercooled and may remain liquid for some time at ordinary temperatures. It boils at about 323°.

Insoluble in water and glycerin; miscible in all proportions with alcohol, chloroform and ether.

Standard.—Benzyl benzoate, determined by the method of the British Pharmacopœia for esters in essential oils, but continuing the boiling for two hours over a flame, contains not less than 99 per cent. of $C_{14}H_{12}O_2$; each millilitre of N/2 alcoholic potassium hydroxide is equivalent to 0·1061 gramme of $C_{14}H_{12}O_2$. Specific gravity, 1·121 to 1·125. Refractive index at 20°, 1·568 to 1·570. Ash, not more than 0·05 per cent.

Action and Uses.—Benzyl benzoate, in common with other compounds containing the benzyl group, diminishes the contractions and lowers the tonus of unstriped muscle. It relieves spasm of the bronchioles and plain muscle of the intestine, bladder and uterus, and has been used in intestinal and other forms of colic and especially in asthma. It has been used also in whooping cough and hiccough. It is **administered** as a 20 per cent. solution in alcohol, as an emulsion prepared with one-tenth of its weight of powdered tragacanth, or in gelatin capsules.

Dose.—0·3 to 0·5 millilitre (5 to 8 minims).

ALCOHOL BENZYLICUM.—Benzyl alcohol, $C_6H_5 \cdot CH_2OH$, may be prepared by the alkaline hydrolysis of benzyl chloride and occurs as a colourless, almost odourless liquid with a specific gravity of about 1·049 to 1·055 and a boiling-range of about 200° to 210°. It is miscible with oils and aromatic hydrocarbons but not with water or paraffins, and is used as a plasticiser and solvent in the manufacture of lacquers and varnishes, and in perfumery.

BENZYLIS SUCCINAS

(Benzyl. Succin.)

Benzyl Succinate

$C_{18}H_{18}O_4 = 298 \cdot 1$

Benzyl succinate, $(CH_2\ COOCH_2 \cdot C_6H_5)_2$, may be prepared by heating succinic acid with benzyl alcohol in the presence of a small quantity of sulphuric acid. It occurs as colourless, odourless and almost tasteless crystals.

Soluble in alcohol, ether, chloroform, and fixed and volatile oils; almost insoluble in water.

Standard.—Benzyl succinate, determined by the method of the British Pharmacopœia for esters in essential oils, but continuing the boiling for two hours over a flame, contains not less than 99 per cent. of $C_{18}H_{18}O_4$; each millilitre of N/2 alcoholic potassium hydroxide is equivalent to 0·07454 gramme of $C_{18}H_{18}O_4$. Melting-point, 45° to 47°. Ash, not more than 0·1 per cent.

Action and Uses.—The action of benzyl succinate upon plain muscle is similar to that of benzyl benzoate, and it is used for the same purposes. It contains a larger proportion of the benzyl radicle, and is stated to be less irritating and less nauseating. It is usually **administered** in tablets and sometimes in capsules with papaverine and hyoscyamine.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

BERBERIDIS CORTEX

(Berber. Cort.)

Barberry Bark

Barberry bark is the dried bark of the stem of *Berberis vulgaris* Linn. (Fam. Berberidaceæ), a shrub indigenous to Great Britain and distributed over the greater part of Europe and Western Asia.

The bark occurs in thin, slightly curved pieces about 5 centimetres long and 12 millimetres broad; the outer surface is longitudinally wrinkled, the ridges flattened, smooth, greyish in colour and dotted with the minute, black perithecia of ascolichens, the furrows shallow and dark in colour; the inner surface is yellowish-brown, fibrous and

longitudinally striated, and may have fragments of the yellowish wood adhering to it. The bark readily separates into an outer and an inner layer, the fracture of the outer portion being short, and that of the inner part fibrous, the latter also being laminated and traversed by pale yellow medullary rays. The taste is bitter, and the odour slight; it colours the saliva yellow. Examined **microscopically**, a transverse section shows the outer part (rhytidoma) of several series of regular, rectangular cork cells formed from successive phellogens, a narrow, parenchymatous cortex, and the inner part (secondary phloem) of single tangential rows of bast fibres, alternating with layers of soft bast, traversed radially by medullary rays 2 to 4 cells broad.

Barberry bark **contains** berberine, a yellow, crystalline alkaloid, together with oxyacanthine and berbamine, two colourless, crystalline alkaloids.

Action and Uses.—Barberry bark is a bitter tonic. It may be administered in the form of decoction (1 in 20), infusion (1 in 20), or tincture (Tinctura Berberidis Corticis, 1 in 10; dose, ½ to 1 fluid drachm), but generally a salt of the alkaloid berberine is preferred.

BERBERINÆ SULPHAS

(Berberin. Sulph.)

Berberine Sulphate

$C_{20}H_{18}O_4N(HSO_4) = 433{\cdot}2$

Synonyms—Berberine Acid Sulphate; Berberinium Acid Sulphate.

Berberine sulphate is the acid salt of a base present in *Berberis vulgaris* Linn. and many other plants. It may be prepared by boiling the powdered drug with water acidified with acetic acid. The decoction is filtered, evaporated to a syrupy liquid and mixed with three times its volume of 20 per cent. sulphuric acid. The crystals thus obtained are washed with cold water, dissolved in boiling water and, after the addition of alcohol and sulphuric acid, again allowed to crystallise. The salt occurs in bright yellow, acicular crystals, or as a dark yellow powder; it has a bitter taste. A solution of 0·05 gramme of berberine sulphate in 5 millilitres of cold water becomes orange-red in colour, but remains clear, on the addition of 2 drops of sodium hydroxide solution; on the addition of 4 drops of acetone a turbidity develops and, on standing, a yellow precipitate (anhydro-berberine-acetone) separates.

Soluble in water (about 1 in 150) and alcohol.

Standard.—Berberine sulphate loses, on drying at 100°, not more than 1 per cent of its weight. Ash, not more than 0·1 per cent. 0·5 gramme in 50 millilitres of water, after precipitation with potassium iodide, leaves an acid solution which requires about 11·5 millilitres of N/10 sodium hydroxide for neutralisation to phenolphthalein,

approximately 11·5 millilitres of N/10 potassium iodide solution being absorbed in the precipitation.

Action and Uses.—Berberine and its salts are employed as bitter stomachics and are used also in the treatment of diarrhœa and of the vomiting of pregnancy. Large doses are said to lower temperature and increase peristalsis. Berberine sulphate has recently been used with success in the treatment of oriental sore (cutaneous leishmaniasis). A solution in sterilised water (0·02 gramme in 1·5 millilitres) is injected subcutaneously at various points around the sore; weekly injections are given, the average period required for healing being seventeen days.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

BERBERINA.—Berberine, $C_{20}H_{19}O_5N$, may be obtained by adding a large excess of sodium hydroxide to an aqueous solution of the sulphate, and extracting with ether. It crystallises from ether in yellow needles which melt at 144°.

BERBERINÆ CARBONAS.—Berberine carbonate, $C_{20}H_{18}O_4N(HCO_3),2H_2O$, is a yellowish-brown, acicular, crystalline substance with a bitter taste, insoluble in cold water and soluble in hot water and alcohol.

BERBERINÆ HYDROCHLORIDUM.—Berberine hydrochloride, $C_{20}H_{18}O_4NCl,2H_2O$, the neutral salt of the base, occurs in bright yellow, acicular crystals or powder with a bitter taste. It is soluble in water (about 1 in 400) and in alcohol, to which it imparts a deep yellow colour.

BERBERINÆ PHOSPHAS.—Berberine acid phosphate, $C_{20}H_{18}O_4N(H_2PO_4)$, $H_3PO_4,1\frac{1}{2}H_2O$, the acid salt of the base, occurs in bright yellow crystals, having a bitter taste. It is the most soluble salt of berberine, being soluble in water (1 in 15) and precipitated by excess of alcohol. Berberine phosphate is administered in mixtures with chloroform water, or in cachets, or pills.

BERBERIS
(Berber.)

Berberis

Berberis is the dried stem of *Berberis aristata* DC. (Fam. Berberidaceæ), a shrub indigenous to India and Ceylon.

The dried stem occurs in fairly straight pieces, from 1 to 4·5 centimetres in diameter, covered with a greyish-brown cork, which is frequently overgrown with moss and lichens. The surface of the smaller stems exhibits longitudinal wrinkles and the remains of spines, while the older pieces are furrowed irregularly and bear scars of lateral branches. Internally the stem is greenish-yellow, when freshly cut, changing to a cinnamon-brown on exposure to the air. The larger stems split radially on drying. The transversely cut surface shows a narrow ring of dark greenish-yellow phloem, traversed by numerous narrow medullary rays, a radiate wood of very narrow wedges, marked with fairly distinct annual rings, and a small lignified pith from 2·5 to 5 millimetres in diameter.

The diagnostic **microscopical** characters shown in transverse section are a number of layers of lignified cork composed of cells with

moderately thick tangential walls, and amongst them an occasional stone cell; a crescent-shaped mass of pericyclic fibres behind each primary phloem group; the secondary phloem consisting of bands of bast fibres alternating with sieve tubes and bast parenchyma; the portions of the medullary rays passing through the phloem composed of cellulose-walled parenchyma, many of the cells containing one, or rarely two, large prismatic crystals of calcium oxalate; a lignified pith of thin-walled parenchyma.

Berberis **contains** the bitter, yellow alkaloid, berberine.

Substitutes.—The stem of *Berberis Aquifolium* Pursh., a species which is largely cultivated as an ornamental shrub, may be distinguished microscopically by the thick-walled pith cells, the absence of stone cells and calcium oxalate in the medullary rays, the absence of pericylic fibres behind the phloem bundles and the only occasional occurrence of bast fibres. *B. asiatica* Roxb. has a thin-walled cork with an occasional stone cell, large stone cells being also present among the bast fibres. *B. Chitria* Ldl. exhibits cork cells with very strongly thickened inner tangential walls, stone cells being absent from this tissue. *B. Lycium* Royle has a thin-walled cork, free from stone cells, the latter being also absent from the rows of phloem fibres. *B. vulgaris* Linn., the only truly British species, may be distinguished by the absence of pericyclic fibres behind the phloem groups, and of stone cells in the medullary rays, and also by the thin-walled pith. The stem of a liane, *Coscinium fenestratum* Colebr., has often been substituted for berberis, but it may readily be distinguished by the large vessels in the wood which are visible to the naked eye, the absence of annual rings, the crenate ring of sclerenchyma beneath the cortex, and the semi-lunar masses of phloem immediately inside this ring.

Action and Uses.—Berberis is used in India and the Eastern Colonies as a bitter tonic in intermittent fevers. An extract made from various species of berberis, combined with opium, is known as "rusot" in India and is valued as a local application in affections of the eye and eyelids. Berberis is **administered** in the form of a tincture.

Preparation

Tinctura Berberidis, B.P.C.—(Tinct. Berber.)—Tincture of Berberis. 1 in 10. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

BETANAPHTHOL

(Betanaph.)

Betanaphthol

$C_{10}H_8O = 144{\cdot}1$

Synonym—Naphthol.

Betanaphthol is β-hydroxynaphthalene, $C_{10}H_7OH$, and may be prepared by heating naphthalene with sulphuric acid at 200°; on fusing the sodium salt of the resulting naphthalene-β-sulphonic acid with sodium hydroxide, the sodium derivative of betanaphthol is formed from which impure betanaphthol is obtained by treatment with hydrochloric acid. It may be purified by recrystallisation or by sublimation. Betanaphthol occurs in white, or nearly white, crystalline lamellæ

or in powder; it has a slight phenolic odour and a sharp but not persistent taste. When heated in sodium hydroxide solution with a few drops of chloroform, a blue colour is produced. On the addition of dilute ammonia solution to ten times its volume of a cold, saturated, aqueous solution of betanaphthol, a bluish fluorescence is produced. Betanaphthol dissolves in solutions of alkali hydroxides with formation of the alkali derivative.

Slightly **soluble** in water (1 in about 1000); more soluble in boiling water (1 in 75) and in water containing boric acid; readily soluble in alcohol (90 per cent.) (1 in 2), ether (1 in about 1·5), chloroform (1 in 17), olive oil (1 in about 12), glycerin and benzene.

Standard, B.P.—Betanaphthol has a melting-point of 120° to 122°. Ash, not more than 0·05 per cent. It complies also with tests for absence of α-naphthol, naphthalene, and other organic substances, and with a test for neutrality.

Action and Uses.—Betanaphthol is an antiseptic and germicide several times stronger than phenol and much less toxic. In large doses, however, it produces toxic symptoms resembling those of phenol, and it may give rise to irritation and inflammation of the kidneys, resulting in the presence of albumin, casts and hæmoglobin in the urine. It is excreted in combination with glycuronic acid, a small portion being oxidised, and giving to the urine a reddish tint. Betanaphthol is employed as an intestinal antiseptic in putrefactive diarrhœa, in enteric fever, and in the summer diarrhœa of children. It has been used with success as a vermifuge in ankylostomiasis and is also useful in fermentative dyspepsia and other gastric disorders. **Externally,** it is applied in the form of ointment or in solution in oil as a parasiticide in scabies, and as an antiseptic and stimulant in eczema and chronic skin diseases. Soaps containing 2 to 5 per cent. are also used. Betanaphthol is usually **administered** in cachets, capsules, or tablets; it may be usefully combined with charcoal.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

ALPHANAPHTHOL.—Alphanaphthol, α-hydroxynaphthalene, $C_{10}H_7OH$, occurs in colourless crystals and melts at about 94°. It is a more powerful antiseptic than betanaphthol and is more poisonous. Alphanaphthol is used as a test for carbohydrates. It is used occasionally as an intestinal injection (1 in 4000) and is sometimes prescribed in pills. Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

ALUMINII NAPHTHOLSULPHONAS.— Aluminium naphtholsulphonate is a salt of β-naphtholsulphonic acid, containing the equivalent of 5 per cent. of aluminium. It occurs as a whitish powder, very soluble in water, and also soluble in alcohol and glycerin. It is precipitated from its solutions by albumin, but redissolves in excess.

CALCII NAPHTHOLSULPHONAS.—Calcium naphtholsulphonate is obtained by heating 10 parts of β-naphthol with 8 parts of sulphuric acid on a water-bath, until the mass dissolves in water, then diluting with water, neutralising with calcium carbonate, and evaporating the filtrate. It occurs in the form of a white, or reddish-white, odourless, bitter, neutral powder, with a sweetish after-taste. It is soluble in water (1 in 1·5) and alcohol (1 in 3), and precipitates albumin, peptone, etc., from acid solutions. Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparation

Unguentum Betanaphtholis Compositum, B.P.C.—(Ung. Betanaph. Co.)—Compound Betanaphthol Ointment. *Syn.*—Kaposi's Compound Ointment; Unguentum Naphthol Compositum; Compound Naphthol Ointment. Betanaphthol, about 8·5 per cent., with chalk, soft soap and lard.

BETANAPHTHYLIS BENZOAS

(Betanaphthyl. Benz.)

Betanaphthyl Benzoate

$C_{17}H_{12}O_2 = 248{\cdot}1$

Synonyms—Naphthol Benzoate; Benzonaphthol.

Betanaphthyl benzoate, $C_6H_5{\cdot}COOC_{10}H_7$, may be prepared by the interaction of betanaphthol and benzoyl chloride. It occurs as a white crystalline, tasteless, odourless powder. The solution in concentrated sulphuric acid is pale yellow in colour, and, when diluted with about ten volumes of water and made alkaline with ammonia, develops a strong green fluorescence.

Almost **insoluble** in water; soluble in alcohol, ether (1 in 40) and chloroform.

Standard.—Betanaphthyl benzoate melts between 107° and 110°. Ash, not more than 0·1 per cent. 1 gramme shaken during one minute with a mixture of 5 millilitres of sodium hydroxide solution and 15 millilitres of water and immediately filtered, produces no blue colour on boiling 10 millilitres of the filtrate with 2 millilitres of chloroform (limit of free betanaphthol); a further 3 millilitre portion of the filtrate, after neutralisation, does not produce a buff-coloured precipitate on the addition of ferric chloride solution (limit of free benzoic acid); the remainder of the filtrate does not produce a blue colouration on the addition of 2 drops of iodine solution (limit of α-naphthol).

Action and Uses.—Betanaphthyl benzoate is used as an intestinal antiseptic. It is decomposed in the intestines into betanaphthol and benzoic acid, the latter substance being absorbed and excreted as hippuric acid. It may be **administered** in mixtures, suspended with mucilage of acacia or tragacanth, but it is best prescribed in cachets, which may also contain charcoal and salts of bismuth.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

BETANAPHTHYLIS SALICYLAS

(Betanaphthyl. Salicyl.)

Betanaphthyl Salicylate

$C_{17}H_{12}O_3 = 264{\cdot}1$

Synonym—Naphthol Salicylate.

Betanaphthyl salicylate, $C_6H_4(OH)COOC_{10}H_7$, may be prepared

by heating together a mixture of betanaphthol-sodium, sodium salicylate and phosphorus oxychloride. It occurs in colourless, odourless, shining crystals, or as a lustrous, crystalline powder. It is unaffected in the cold by alkalis or acids, but when heated with these reagents in strong solutions it yields betanaphthol and salicylic acid. On adding 0·1 gramme to 2 or 3 millilitres of sulphuric acid, a lemon-yellow solution results in a very short time, which, upon the addition of a trace of nitric acid, changes to olive-green (distinction from salol).

Insoluble in water and glycerin; soluble with difficulty in alcohol, soluble in boiling alcohol (1 in 3), ether (1 in 15), benzene and warm linseed oil.

Standard.—Betanaphthyl salicylate melts between 93° and 95°. Ash, not more than 0·1 per cent. The filtrate, obtained by shaking 1 gramme with 20 millilitres of boiling water and filtering, is neutral to litmus paper (limit of free acid), does not give a crystalline deposit on cooling (limit of free salicylic acid and uncombined betanaphthol), and does not develop a violet colouration, on the addition of 2 drops of ferric chloride solution (limit of fresh salicylic acid).

Action and Uses.—Betanaphthyl salicylate has no action in the stomach, but, owing to its decomposition in the small intestine, exerts there the effects of betanaphthol and of salicylic acid. Its uses resemble those of salol, but its naphthol group is more powerfully antiseptic than the phenol group of salol, and is less liable to give rise to toxic symptoms. It is employed in cases of intestinal fermentation and, less frequently, in rheumatism and rheumatic manifestations. It may be **administered** in mixtures or in cachets.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

BETEL
(Betel)
Betel

Synonym—Betel Leaves.

Betel consists of the dried leaves of *Piper Betle* Linn. (Fam. Piperaceæ), a liane indigenous to and cultivated in India, Ceylon and the Malay Islands. The leaves are picked while green, pressed together by means of stones, dried and tied up into small packets.

The leaves are broadly ovate, up to about 15 centimetres long and 10 centimetres broad, with acuminate apex and cordate base, or they are ovate-oblong and oblique with an unequal base; five to seven prominent lateral veins, arising from the basal fourth of the midrib, turn outwards towards the margin and curve in an arc towards the apex; they are dull brown, thin and brittle; the mesophyll contains numerous small oil cells filled with a dark brown secretion. The taste is slight, warm and aromatic.

Betel **contains** a volatile oil (0·2 to 1·0 per cent.) containing betelphenol (chavibetol, an isomeride of eugenol), chavicol, cadinene and various sesquiterpenes.

Action and Uses.—Betel possesses antiseptic, stimulant and carminative properties and is used in India as a masticatory. The juice obtained from the fresh leaves has similar properties. The Malays use the leaves, generally admixed with lime and scrapings of areca nut, for the same purpose.

BISMUTHI CARBONAS
(Bism. Carb.)
Bismuth Carbonate

Synonyms—Bismuth Oxycarbonate; Bismuth Subcarbonate.

Bismuth carbonate may be prepared by the interaction of solutions of bismuth nitrate and a soluble carbonate. It is a basic salt, the composition of which varies with the conditions under which it is precipitated, but is represented approximately by the formula $(Bi_2O_2CO_3)_2,H_2O$. It occurs as a white or creamy-white powder without odour or taste, and is stable in air. The bulk-density of bismuth carbonate varies considerably and depends largely upon the conditions of precipitation. It is completely soluble with effervescence in mineral acids, forming solutions of bismuth salts.

Insoluble in water and neutral organic solvents.

Standard, B.P.—Bismuth carbonate leaves on ignition not less than 89 per cent. and not more than 91 per cent. of residue. Arsenic limit, 2 parts per million. It complies also with a test for absence of silver and with limit tests for lead, copper, sulphate, alkalis and alkaline earths, nitrate and chloride.

Action and Uses.—Bismuth carbonate is prescribed, like other salts of bismuth, for its local action. Administered **internally** it is not absorbed, but forms a coating on the walls of the stomach and intestines, protecting them from irritation caused by food and the secretions, and allaying inflammation. Bismuth carbonate is, therefore, of value in dyspepsia and vomiting, also in gastric inflammation and diarrhœa. In the intensive alkaline treatment of gastric and duodenal ulcer, bismuth carbonate is largely employed in conjunction with magnesium carbonate, sodium bicarbonate, and calcium carbonate or chalk; various mixtures of these substances, such as Pulvis Bismuthi Compositus, are described as MacLean's Powder. **Externally,** bismuth carbonate is sedative and astringent; it is occasionally used in the form of ointment, lotion or dusting powder in irritable conditions of the skin. Symptoms of poisoning may occur due to absorption from large raw surfaces. Salts of bismuth obstruct the passage of X-rays and large quantities (2 to 6 ounces) of the carbonate or subchloride, suspended in a

suitable medium, may be given to assist the X-ray diagnosis of disorders of the stomach and intestines. As barium sulphate serves equally well for this purpose and is much less costly, bismuth is now rarely used. A thin cream of bismuth carbonate with mucilage may be injected into sinuses to show their extent under X-rays.

Bismuth carbonate may be **administered** in cachets, powders or mixtures. Bismuth salts of high density are most suitable for dispensing in cachets. For the preparation of mixtures, those of medium or low density should be selected. If such practice is followed the use of suspending agents in mixtures containing bismuth salts is not essential. Preference should be given to compound powder of tragacanth when substances necessitating the use of a suspending agent are ordered with bismuth salts; the addition of mucilage of acacia or powdered acacia is liable to produce indiffusible masses in the mixture. For administration in lozenge form, Trochiscus Bismuthi Compositus is preferred; or soft gelatin pastilles may be used, containing a larger proportion of bismuth, with morphine or cocaine, if desired.

Dose.- 0·6 to 2 grammes (10 to 30 grains).

Preparations

Glycerinum Bismuthi Carbonatis, B.P.C.—(Glycer. Bism. Carb.)—Glycerin of Bismuth Carbonate. Bismuth carbonate, 50 per cent. w/v, in distilled water and glycerin. Dose.– 0·6 to 4 millilitres (10 to 60 minims).

Mistura Bismuthi et Sodii Bicarbonatis, B.P.C.—(Mist. Bism. et Sod. Bicarb.)—Bismuth and Sodium Bicarbonate Mixture. *Syn.*—Mistura Bismuthi cum Soda; Bismuth and Soda Mixture. Each fluid ounce contains 10 grains each of bismuth carbonate, sodium bicarbonate and light magnesium carbonate, in distilled water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Mistura Bismuthi et Pancreatini, B.P.C.—(Mist. Bism. et Pancreatin.)—Mixture of Bismuth and Pancreatin. Each fluid ounce contains 10 grains each of bismuth carbonate and sodium bicarbonate 4 grains of pancreatin and 4 minims of dilute hydrocyanic acid, in chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Pasta Bismuthi, B.P.C.—(Past. Bism.)—Bismuth Paste. Bismuth carbonate, 30 per cent., in white soft paraffin.

Pulvis Bismuthi Compositus, B.P.C.—(Pulv. Bism. Co.)—Compound Bismuth Powder. Bismuth carbonate, 1 part; calcium carbonate, 3 parts; heavy magnesium carbonate, 3 parts; sodium bicarbonate, 1 part. Dose.– 1 to 4 grammes (¼ to 1 drachm).

Tabellæ Bismuthi et Sodii Bicarbonatis, B.P.C.—(Tab. Bism. et Sod. Bicarb.)—Bismuth and Sodium Bicarbonate Tablets. Each tablet contains 2 grains of bismuth carbonate and 3 grains of sodium bicarbonate. Dose.– 1 to 3 tablets.

Trochiscus Bismuthi Compositus, B.P.—(Troch. Bism. Co.)—Compound Lozenge of Bismuth. *Syn.*—Compound Bismuth Lozenge. Each lozenge contains approximately 0·15 gramme or 2¼ grains each of bismuth carbonate and heavy magnesium carbonate and approximately 0·3 gramme or 4½ grains of calcium carbonate, in a basis flavoured with oil of rose.

Trochisci Alkalini Compositi, B.P.C.—(Troch. Alk. Co.)—Compound Alkaline Lozenges. Each lozenge contains 12 grains of compound bismuth powder.

Unguentum Bismuthi, B.P.C.—(Ung. Bism.)—Bismuth Ointment. Bismuth carbonate, 12·5 per cent., in white soft paraffin.

BISMUTHI CITRAS
(Bism. Cit.)
Bismuth Citrate

Bismuth citrate is probably a monobismuthylcitric acid, $H_2C_6H_5O_7$ (BiO), and may be obtained by mixing citric acid with bismuth subnitrate and distilled water, heating on a water-bath with frequent stirring until a drop of the mixture yields a clear solution with solution of ammonia, adding water, allowing to deposit, washing the precipitate thus obtained until the washings are tasteless, and drying at a gentle heat. It occurs as a white, crystalline powder without odour or taste.

Insoluble in water and alcohol; soluble in solution of ammonia.

Standard.—Bismuth citrate yields on ignition, followed by re-ignition with a few drops of nitric acid, not less than 55 per cent. and not more than 59 per cent. of residue, Bi_2O_3. Arsenic limit, 2 parts per million. It complies with the tests of the British Pharmacopœia for chlorides, sulphates, silver and alkalis and alkaline earths in Bismuthi Salicylas. 5 millilitre portions of the filtrate obtained by igniting 3 grammes, dissolving the residue in 4 millilitres of nitric acid, evaporating to half its volume and diluting to 100 millilitres with water and then filtering, comply with the limit tests for lead and copper in Bismuthi Carbonas. 0·01 gramme treated with 1 millilitre of water and 5 millilitres of sulphuric acid, cooled, and 5 millilitres of ferrous sulphate solution carefully superimposed, shows no red or brown zone within five minutes (limit of nitrate).

Action and Uses.—Bismuth citrate may be used instead of bismuth carbonate and subnitrate for its local action on the stomach and intestines. Gauze impregnated with bismuth citrate has been used in place of iodoform gauze and has the advantage of being odourless.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

Preparations

Liquor Bismuthi Concentratus, B.P.C.—(Liq. Bism. Conc.)—Concentrated Solution of Bismuth. It contains the equivalent of from 10 to 12 per cent. w/v of Bi_2O_3 and is twice the strength of solution of bismuth and ammonium citrate. Dose.– 1 to 2 millilitres (¼ to ½ fluid drachm).

Liquor Bismuthi et Ammonii Citratis, B.P.C.—(Liq. Bism. et Ammon. Cit.)—Solution of Bismuth and Ammonium Citrate. It contains the equivalent of from 5 to 6 per cent. w/v of Bi_2O_3. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This solution, prepared from bismuth subnitrate and citric acid, was included in the British Pharmacopœia, 1914.

Mistura Bismuthi Composita, B.P.C.—(Mist. Bism. Co.)—Compound Bismuth Mixture. Each fluid drachm contains ½ fluid drachm of concentrated solution of bismuth, 7½ minims of tincture of nux vomica and 2 minims of dilute hydrocyanic acid, with chloroform, solution of bordeaux B and distilled water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Mistura Bismuthi Composita cum Pepsino, B.P.C.—(Mist. Bism. Co. c. Pepsin.)—Compound Bismuth Mixture with Pepsin. Each fluid drachm contains ½ fluid drachm of concentrated solution of bismuth, 1 grain of pepsin,

7½ minims of tincture of nux vomica and 2 minims of dilute hydrocyanic acid, with chloroform, solution of bordeaux B and distilled water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Mistura Bismuthi Composita cum Pepsino et Morphina, B.P.C.—(Mist. Bism. Co. c. Pepsin. et Morph.)—Compound Bismuth Mixture with Pepsin and Morphine. Each fluid drachm contains $\frac{1}{40}$ grain of morphine hydrochloride in compound bismuth mixture with pepsin. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

BISMUTHI ET AMMONII CITRAS

(Bism. et Ammon. Cit.)

Bismuth and Ammonium Citrate

Synonym—Bismuth-ammonium Citrate.

Bismuth and ammonium citrate may be prepared by dissolving bismuth citrate in ammonia solution, filtering, evaporating the solution to a syrupy consistence and spreading on glass plates to dry. It occurs as shining, semi-opaque scales, or as a white, odourless powder, with a slightly metallic taste.

Slowly **soluble** in water; slightly soluble in alcohol.

Standard.—Bismuth and ammonium citrate yields on ignition not less than 46 per cent. and not more than 50 per cent. of residue, Bi_2O_3. Arsenic limit, 2 parts per million. 5 millilitre portions of the filtrate obtained by igniting 4 grammes, dissolving the residue in 4 millilitres of nitric acid, evaporating to half its volume and diluting to 100 millilitres with water and then filtering, comply with the limit tests for lead, copper, silver and alkaline earths in Bismuthi Carbonas. 0·01 gramme treated with 1 millilitre of water and 5 millilitres of sulphuric acid, cooled and 5 millilitres of ferrous sulphate solution carefully superimposed, produces no red or brown zone within five minutes (limit of nitrate).

Action and Uses.—Bismuth and ammonium citrate is best **administered** in aqueous solution or as Liquor Bismuthi et Ammonii Citratis since it is somewhat astringent and irritating. It should not be prescribed when there is acute inflammation.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

BISMUTHI ET SODII TARTRAS

(Bism. et Sod. Tart.)

Bismuth Sodium Tartrate

Synonyms—Soluble Bismuth Tartrate; Acid Bismuth Sodium Tartrate.

Bismuth sodium tartrate consists of a mixture of bismuth and sodium tartrates with an excess of tartaric acid, and may contain

sodium salts of bismuthyltartaric acids. It may be prepared by dissolving bismuth tartrate in solution of sodium hydroxide, adding an excess of tartaric acid and evaporating the solution. Bismuth tartrate, $H_2C_4H_4O_6 \cdot 2H(BiO)C_4H_4O_6$, or $Bi_2(C_4H_4O_6)_3$, for this purpose, is prepared by interaction between bismuth subnitrate and tartaric acid in the presence of water by a process similar to that described for bismuth citrate. When bismuth tartrate is obtained by other methods it may contain different proportions of bismuth and tartrate and when dissolved in the sodium hydroxide solution, unless properly adjusted, may on evaporation yield a product of more variable composition. It occurs as a white powder or in scales.

Slowly, but completely **soluble** in water forming a strongly acid solution.

Standard.—Bismuth sodium tartrate, determined by the method for bismuth in Bismuthi Subchloridum, using about 0·5 gramme accurately weighed, contains not less than 38 per cent. and not more than 44 per cent. of Bi. Arsenic limit, 2 parts per million. 5 millilitre portions of the filtrate obtained by igniting 4 grammes, dissolving the residue in 4 millilitres of nitric acid, evaporating to half its volume and diluting to 100 millilitres with water and then filtering, comply with the limit tests for lead, copper and silver in Bismuthi Carbonas. 0·01 gramme, treated with 1 millilitre of water and 5 millilitres of sulphuric acid, cooled and 5 millilitres of ferrous sulphate solution carefully superimposed, produces no red or brown zone within five minutes (limit of nitrate).

Action and Uses.—Bismuth sodium tartrate may be used instead of bismuth carbonate for its local action on the walls of the stomach and intestines. It is best **administered** as Liquor Bismuthi Acidus, which is a suitable preparation of bismuth for mixtures containing pepsin.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

BISMUTHI ET SODII TARTRAS (NEUTRAL).—Neutral bismuth sodium tartrate suitable for purposes of injection may be obtained in solution by dissolving bismuth tartrate in the requisite amount of sodium hydroxide solution or, in the solid condition, by evaporation of the neutral solution. Aqueous solutions of bismuth and sodium tartrate for injection may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. Oily suspensions may be prepared with olive oil or almond oil which has been sterilised by heating at 150° for one hour and allowed to cool; the final container is sterilised at 100° for thirty minutes.

Preparations

Liquor Bismuthi Acidus, B.P.C.—(Liq. Bism. Acid.)—Acid Solution of Bismuth. A solution of an acid bismuth sodium tartrate containing the equivalent of from 9 to 10 per cent. w/v of Bi_2O_3. Dose.– 1 to 2 millilitres (¼ to ½ fluid drachm).

Mistura Bismuthi Composita Acida cum Pepsino, B.P.C.—(Mist. Bism. Co. Acid. c. Pepsin.)—Compound Acid Mixture of Bismuth with Pepsin. Each fluid drachm contains acid solution of bismuth equivalent to about 5 grains of bismuth sodium tartrate, 1 grain of pepsin, and about ½ minim of liquid extract of nux vomica, with dilute hydrocyanic acid, solution of bordeaux B and double chloroform water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

BISMUTHI NAPHTHOLAS
(Bism. Naphthol.)
Bismuth Naphtholate

Synonym—Bismuth Betanaphtholate.

Bismuth naphtholate may be obtained by the action of sodium naphtholate on bismuth nitrate, or of an alkaline solution of betanaphthol on a solution of bismuth nitrate in glycerin or dilute acid. It occurs as a pinkish-brown, odourless, nearly tasteless and neutral powder, darkening on keeping. It should be free from sharp odour or burning taste (distinction from a mixture of betanaphthol and bismuth salt).

Insoluble in water; slightly soluble in alcohol.

Standard.—Bismuth naphtholate yields on ignition, followed by re-ignition with a few drops of nitric acid, not less than 73 per cent. and not more than 78 per cent. of residue, Bi_2O_3. When treated with excess of hydrochloric acid and extracted by shaking with successive portions of chloroform, it yields not less than 15 per cent. of betanaphthol. Arsenic limit, 2 parts per million. 5 millilitre portions of the filtrate obtained by igniting 3 grammes, dissolving the residue in 4 millilitres of nitric acid, evaporating to half its volume and diluting to 100 millilitres with water and then filtering, comply with the limit tests for lead, copper, silver, and alkalis and alkaline earths in Bismuthi Carbonas.

Action and Uses.—Bismuth naphtholate is decomposed in the intestine, betanaphthol being liberated. It is employed as an intestinal disinfectant, its action in this respect resembling that of betanaphthol. The naphtholate is often employed in combination with sodium bicarbonate and wood charcoal, and is administered enclosed in a cachet. It may be used **externally** as a dusting powder in the treatment of skin diseases and ulcers in place of iodoform.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

BISMUTHI OLEAS
(Bism. Oleas)
Bismuth Oleate

Bismuth oleate may be obtained by the interaction of solutions of bismuth nitrate and hard soap. It occurs in nearly white, pasty masses or as a white powder.

Standard.—Bismuth oleate yields on ignition, followed by re-ignition with a few drops of nitric acid, not less than 20 per cent. and not more than 22 per cent. of residue, Bi_2O_3.

Action and Uses.—Bismuth oleate is used with zinc oxide or starch as a dusting powder in hyperæmic conditions of the skin, or in the form of Unguentum Bismuthi Oleatis for chapped hands.

Preparation

Unguentum Bismuthi Oleatis, B.P.C.—(Ung. Bism. Oleat.)—Bismuth Oleate Ointment. Bismuth oleate, 12·5 per cent., in white soft paraffin.

BISMUTHI OXIDUM
(Bism. Oxid.)
Bismuth Oxide

$Bi_2O_3 = 466·0$

Bismuth oxide may be prepared by the interaction of bismuth subnitrate with boiling solution of sodium hydroxide. It occurs as a lemon-yellow powder, which is dissolved by moderately strong hydrochloric or nitric acid.

Insoluble in water.

Standard.—Bismuth oxide loses on ignition not more than 1 per cent. of its weight. Arsenic limit, 2 parts per million.

Action and Uses.—Bismuth oxide resembles the carbonate and subnitrate in its therapeutic action. One part with 7 parts of benzoinated lard forms a useful sedative ointment which is, in some cases, preferable to zinc ointment.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

Bismuthi Hydroxidum.—Bismuth hydroxide is the name applied to the yellow, partly hydrated bismuth oxide, and to the white, hydrated oxide, which frequently contains a large proportion of carbonate or oxysalt, precipitated from solutions of bismuth salts by the addition of alkali. Bismuth hydroxide has the same action as the carbonate, although it is less frequently used. Suspensions in oil or water have been used as injections in the treatment of syphilis. Suspensions in oil for injection may be prepared by mixing the bismuth hydroxide with olive oil or almond oil which has been sterilised by heating at 150° for one hour and allowed to cool. The final container may be sterilised at 100° for thirty minutes. Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

Preparations

Mistura Bismuthi et Magnesii Hydroxidum, B.P.C.—(Mist. Bism. et Mag. Hydrox.)—Mixture of Bismuth and Magnesium Hydroxides. Equal parts of mixture of bismuth hydroxide and mixture of magnesium hydroxide. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Mistura Bismuthi Hydroxidi, B.P.C.—(Mist. Bism. Hydrox.)—Bismuth Hydroxide Mixture. *Syn.*—Magma Bismuthi. It contains the equivalent of from 9 to 11 per cent. w/v of Bi_2O_3. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

BISMUTHI OXYIODOGALLAS
(Bism. Oxyiodogall.)
Bismuth Oxyiodogallate

Synonym—Bismuth Oxyiodosubgallate.

Bismuth oxyiodogallate may be prepared by treating bismuth oxyiodide with gallic acid, or by heating bismuth subgallate with hydriodic

acid, until a greyish-green product is obtained, the resulting powder being subsequently well washed and dried at a moderate temperature. It occurs as a bulky, greyish or greyish-green, odourless and tasteless powder, which darkens on exposure to moist air. It is decomposed by alkalis and mineral acids; with concentrated sulphuric acid iodine is liberated.

Insoluble in water, alcohol, ether and chloroform.

Standard.—Bismuth oxyiodogallate leaves on ignition not less than 43 per cent. and not more than 45 per cent. of residue, Bi_2O_3; it contains not less than 20 per cent. of I.

Assay.—Heat about 0·5 gramme, accurately weighed, with 10 millilitres of 2N sodium hydroxide until dissolved; cool and add 20 millilitres of N/10 silver nitrate and 20 millilitres of nitric acid; boil for five minutes, dilute with water to about 100 millilitres, cool, and titrate with N/10 ammonium thiocyanate, using ferric ammonium sulphate as indicator and correcting for the chloride present in the 10 millilitres of 2N sodium hydroxide; each millilitre of N/10 silver nitrate is equivalent to 0·01269 gramme of I.

Action and Uses.—Bismuth oxyiodogallate is used chiefly as an application in skin diseases in which an astringent and protective powder is indicated. It is free from toxic and irritant properties and covers about four times as much surface as an equal weight of iodoform, for which it may be used as a substitute. It may be applied to burns and ulcers, and as a dusting powder after operations; it is also used in the form of ointment (10 per cent.) prepared with soft paraffin or paraffin ointment. Suppositories containing 0·12 to 0·2 gramme (2 to 3 grains) are used in the treatment of hæmorrhoids.

BISMUTHI SALICYLAS
(Bism. Salicyl.)

Bismuth Salicylate

Synonym—Bismuth Subsalicylate.

Bismuth salicylate may be prepared by the interaction of hydrated bismuth oxide and salicylic acid. It is a basic salt, corresponding approximately to the formula, $C_6H_4(OH)\cdot COOBiO$. It occurs as a white or nearly white, amorphous powder, without odour or taste. It is stable in air, but is partially dissociated by contact with water or alcohol with liberation of salicylic acid and formation of a more basic salt. The salicylic acid radicle may be detected in bismuth salicylate by shaking with ether and dilute sulphuric acid; salicylic acid passes into the ethereal layer in which it may be detected

by the violet colouration produced on shaking with water containing a trace of ferric chloride. It should be **stored** protected from light.

Insoluble in water.

Standard, B.P.—Bismuth salicylate yields on ignition, followed by re-ignition at a low red heat with a few drops of nitric acid, not less than 62 per cent. and not more than 66 per cent. of residue, Bi_2O_3. Arsenic limit, 2 parts per million. It complies also with a test for absence of silver and with limit tests for free salicylic acid, lead, copper, chloride, sulphate, nitrate and for alkalis and alkaline earths.

Action and Uses.—Bismuth salicylate is a valuable intestinal antiseptic and protective to the intestinal tract. It is especially useful for the treatment of summer diarrhœa of children, dysentery, typhoid fever, and of ulcerative colitis. Bismuth salicylate is best **administered** in cachets, or it may be suspended in mixtures with mucilage of tragacanth. It may be rendered more easily miscible with water by the addition of alcoholic preparations. The use of a suspending agent is not necessary when a bismuth salicylate of low density is employed with compound infusion of orange or compound infusion of gentian as a vehicle. Bismuth salicylate is decomposed in the presence of alkali bicarbonates with effervescence. In dispensing mixtures containing the salicylate and a bicarbonate, the two reacting salts should be rubbed together with warm water and the conversion to carbonate accomplished before the mixture is completed. Bismuth salicylate suspended in oil has given satisfactory results in the treatment of syphilis when administered intramuscularly and may be used in the form of Injectio Bismuthi Salicylatis. Suspensions of bismuth salicylate in oil for **injection** may be prepared by mixing bismuth salicylate with olive oil or almond oil which has been sterilised by heating at 150° for one hour and allowed to cool. The final container may be sterilised by heating at 100° for thirty minutes.

Dose.—0·6 to 2 grammes (10 to 30 grains), by the mouth; 0·06 to 0·12 gramme (1 to 2 grains), by intramuscular injection.

BISMUTHI BENZOAS.—Bismuth benzoate, $C_6H_5{\cdot}COO(BiO)$, occurs as a white powder, containing the equivalent of about 65 per cent. of bismuth oxide. It is insoluble in water. Bismuth benzoate has medicinal properties similar to those of the salicylate and may be given in similar doses.

Preparation

Injectio Bismuthi Salicylatis, B.P.—(Inj. Bism. Salicyl.)—Injection of Bismuth Salicylate. A sterile preparation containing bismuth salicylate, 10 per cent., w/v, with camphor and phenol, in sterilised olive oil; 1·2 millilitres contains 0·12 gramme, and 20 minims contains about 2 grains, of bismuth salicylate. Dose.—0·6 to 1·2 millilitres (10 to 20 minims), by intramuscular injection.

BISMUTHI SUBCHLORIDUM

(Bism. Subchlor.)

Bismuth Subchloride

Synonym—Bismuth Oxychloride.

Bismuth subchloride may be prepared by adding a solution of bismuth nitrate to a solution of sodium chloride, or to very dilute hydrochloric acid; it may also be prepared by pouring a solution of bismuth oxide in hydrochloric acid into water. It occurs as a lustrous, impalpable, white powder. Bismuth subchloride prepared by precipitating bismuth nitrate with sodium chloride is known as "blanc d'Espagne," or flake-white; when similarly prepared by precipitating with dilute hydrochloric acid it is termed "blanc de perle" or pearl-white.

Insoluble in water; readily soluble in acids.

Standard.—Bismuth subchloride contains not less than 79 per cent. and not more than 81 per cent. of Bi, and not less than 12·5 per cent. of Cl. It dissolves completely in nitric acid without effervescence (limit of carbonate and insoluble material).

Assay.—For bismuth. Dissolve about 0·2 gramme, accurately weighed, in 2 millilitres of hydrochloric acid; dilute to 30 millilitres with water and precipitate the bismuth as sulphide by passing hydrogen sulphide through the solution; dissolve the precipitate in hot nitric acid diluted with an equal volume of water, precipitate the bismuth as carbonate, wash, dry, ignite and weigh the residue of Bi_2O_3; 1 gramme of Bi_2O_3 is equivalent to 0·8970 gramme of Bi.

For chlorine. Dissolve 0·5 gramme in 10 millilitres of a mixture of equal parts of nitric acid and water and add 20 millilitres of N/10 silver nitrate. Boil for ten minutes, cool, and titrate with N/10 ammonium thiocyanate using ferric ammonium sulphate as indicator; each millilitre of N/10 silver nitrate is equivalent to 0·003546 gramme of Cl.

Action and Uses.—Bismuth subchloride may be used internally or externally in place of other inorganic salts of bismuth. The fineness of the powder and the readiness with which it adheres to the skin render it of value as a cosmetic. It may be applied to mucous surfaces by insufflation. It is also used for hæmorrhoids and dysentery in the form of suppositories (10 grains in each), or as an ointment (6 per cent.). As a suspension in camphor water, bismuth subchloride is employed by intramuscular injection in the treatment of syphilis; doses of 0·2 to 0·3 gramme may be given twice weekly up to a total of 2 to 3 grammes in 10 or 15 injections.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

Preparation

Unguentum Resorcinolis et Bismuthi Compositum, B.P.C.—(Ung. Resorcin. et Bism. Co.)—Compound Resorcinol and Bismuth Ointment. *Syn.*—Unguentum Resorcini et Bismuthi Compositum; Compound Bismuth and Resorcin Ointment. Resorcinol and bismuth subchloride, of each, 8 per cent., with distilled water, zinc oxide, starch, birch tar oil, oil of cade and wool fat.

BISMUTHI SUBGALLAS
(Bism. Subgall.)
Bismuth Subgallate

Synonym—Bismuth Oxygallate.

Bismuth subgallate is prepared by the action of gallic acid on freshly precipitated hydrated bismuth oxide. It occurs as a citron-yellow, odourless, and tasteless powder. On heating, it decomposes without melting. When the bismuth is removed by suspending the salt in water and passing hydrogen sulphide, the solution, after filtering and boiling, gives a bluish-black colour with ferric chloride.

Insoluble in water, ether and alcohol; readily soluble in the hot mineral acids, with decomposition, and in solutions of the alkali hydroxides, forming clear, yellow solutions, rapidly turning to deep red.

Standard.—Bismuth subgallate yields on ignition, followed by re-ignition with a few drops of nitric acid, not less than 52 per cent. and not more than 57 per cent. of residue, Bi_2O_3, calculated on the substance dried at 100°. Loss on drying at 100°, not more than 5 per cent. Arsenic limit, 2 parts per million. 5 millilitre portions of the filtrate, obtained by igniting 3 grammes, dissolving the residue in 4 millilitres of nitric acid, evaporating to half its volume and diluting to 100 millilitres with water, and then filtering, comply with the limit tests for lead, copper, silver, and alkalis and alkaline earths in Bismuthi Carbonas. 0·01 gramme treated with 1 millilitre of water and 5 millilitres of sulphuric acid, cooled, and 5 millilitres of ferrous sulphate solution carefully superimposed, shows no red or brown zone within five minutes (limit of nitrate). When 1 gramme is shaken with 20 millilitres of alcohol (90 per cent.) for one minute, filtered and the filtrate evaporated to dryness on a water-bath, not more than 0·001 gramme of residue is obtained (limit of free gallic acid).

Action and Uses.—Bismuth subgallate has mild astringent properties, and is sometimes given for diarrhœa and colitis. It is usually **administered** in cachets. An 8 per cent. suspension in mucilage of starch may be used as an injection in the treatment of gonorrhœa. It is employed as an ointment (1 in 10) for eczema and burns, and as suppositories for the treatment of hæmorrhoids. Bismuth subgallate is also used as a dusting powder, either alone or diluted with starch, purified talc, zinc oxide, or boric acid.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

Preparations

Suppositorium Bismuthi Subgallatis, B.P.C.—(Supp. Bism. Subgall.)—Bismuth Subgallate Suppository. Each suppository contains 5 grains of bismuth subgallate.

Suppositorium Bismuthi Subgallatis Compositum, B.P.C.—(Supp. Bism. Subgall. Co.)—Compound Bismuth Subgallate Suppository. *Syn.*—Suppositorium Bismuthi et Resorcini Compositum; Compound Bismuth and Resorcin Suppository. Each suppository contains 3 grains of bismuth subgallate, 1 grain of resorcinol, 2 grains of zinc oxide and 1 minim of balsam of Peru.

BISMUTHI SUBNITRAS

(Bism. Subnit.)

Bismuth Subnitrate

Synonym—Bismuth Oxynitrate.

Bismuth subnitrate is a basic salt and may be prepared by pouring a solution of bismuth nitrate into water containing sodium hydroxide. It occurs as a white, microcrystalline, odourless and tasteless powder which is slightly acid to litmus. The product has the composition $6Bi_2O_3,5N_2O_5,9H_2O$, which yields about 80 per cent. of Bi_2O_3, whereas the definite oxysalt of the formula $BiONO_3,H_2O$, obtained by precipitation from water without alkali, yields about 76 per cent. of Bi_2O_3.

Insoluble in water and alcohol; readily soluble in nitric or hydrochloric acid.

Standard.—Bismuth subnitrate yields on ignition not less than 79 per cent. and not more than 81 per cent. of residue, Bi_2O_3. Arsenic limit, 2 parts per million. It complies with the limit tests for lead, copper, silver, chloride, sulphate, and alkalis and alkaline earths in Bismuthi Carbonas. It dissolves completely in an equal quantity of warm nitric acid without effervescence (limit of carbonate and insoluble matter).

Action and Uses.—Bismuth subnitrate differs from other salts of bismuth in that it is more astringent. It is used as a dusting powder and in the form of Insufflatio Bismuthi et Morphinæ for nasal catarrh. Bismuth subnitrate forms the principal constituent of Beck's pastes which are used for the radiographic detection of the course of fistulous tracts and for their treatment. Two pastes are used for injection into the fistula for these purposes: (a) for diagnosis and early treatment. Bismuth subnitrate, 30 parts; yellow soft paraffin, 60 parts; stir the powder slowly into the melted paraffin from which all water has been expelled. (b) for late treatment. Bismuth subnitrate, 30 parts; white wax, hard paraffin, of each, 5 parts; yellow soft paraffin, 60 parts. In some cases 1 per cent. of solution of formaldehyde is added. Care should be taken that no water is spilled into the pastes during heating. Pasta Bismuthi et Iodoformi is used as a dressing to promote the healing of wounds by first intention, but care must be taken to remove excess of the preparation.

Bismuth subnitrate is **administered** as powder or in cachets, but more frequently in mixtures, which may be thickened with syrup or glycerin. Addition of a gum as suspending agent should be avoided in mixtures containing bismuth subnitrate, unless its use is essential for some other reason, because gummy substances cause the insoluble salt to cohere and form indiffusible masses. A suitable vehicle for the administration of this and other salts of bismuth is compound infusion of orange. Bismuth subnitrate is **incompatible** with carbonates and bicarbonates; also with iodides, tannin and sulphur. If a mixture containing the subnitrate and a carbonate or bicarbonate is prescribed,

the two reacting salts should be rubbed together with warm water until the effervescence subsides before the mixture is completed.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

BISMUTH NITRATE, $Bi(NO_3)_3,5H_2O$, obtained by dissolving bismuth, or its oxide or carbonate, in nitric acid and crystallising, occurs in colourless, deliquescent crystals. It melts at 73° in its water of crystallisation and is decomposed at a higher temperature; it is soluble in a very small quantity of water, the addition of more water to this strongly acid solution causing separation of oxysalts. Bismuth nitrate is an astringent antiseptic used externally for certain skin diseases. For chapped and cracked hands, 10 to 60 grains of bismuth nitrate dissolved, without heat, in 1 fluid ounce of glycerin, forms a useful application.

Preparations

Insufflatio Bismuthi et Morphinæ, B.P.C.—(Insuff. Bism. et Morph.)—Bismuth and Morphine Insufflation. *Syn.*—Ferrier's Snuff; Bismuth and Morphine Snuff. Bismuth subnitrate, 75 per cent., and morphine hydrochloride, 0·4 per cent., with acacia.

Pasta Bismuthi et Iodoformi, B.P.C.—(Past. Bism. et Iodof.)—Bismuth and Iodoform Paste. *Syn.*—B.I.P.P. Bismuth subnitrate, 25 per cent., and iodoform, 50 per cent., with liquid paraffin.

Unguentum Resorcinolis Compositum, B.P.C.—(Ung. Resorcin. Co.)—Compound Resorcinol Ointment. *Syn.*—Unguentum Resorcini Compositum; Compound Resorcin Ointment. Resorcinol, 4 per cent., and bismuth subnitrate, 8 per cent., with distilled water, starch, zinc oxide, birch tar oil and potassium pyrosulphite, in wool fat, ceresin and yellow soft paraffin.

BISMUTHI TANNAS

(Bism. Tann.)

Bismuth Tannate

Bismuth tannate may be prepared by mixing freshly precipitated hydrated bismuth oxide with tannic acid and drying. It occurs as a brownish-yellow, odourless and tasteless powder.

Insoluble in water, alcohol and ether.

Standard.—Bismuth tannate yields on ignition, followed by re-ignition with a few drops of nitric acid, not less than 42 per cent. and not more than 47 per cent. of residue, Bi_2O_3. Arsenic limit, 2 parts per million. 5 millilitre portions of the filtrate obtained by igniting 3 grammes, dissolving the residue in 4 millilitres of nitric acid, evaporating to half its volume and diluting to 100 millilitres with water, and then filtering, comply with the limit tests for lead, copper, silver, and alkalis and alkaline earths in Bismuthi Carbonas. 0·1 gramme treated with 1 millilitre of water and 5 millilitres of sulphuric acid, cooled, and 5 millilitres of ferrous sulphate solution carefully superimposed, shows no red or brown zone within five minutes (limit of nitrate).

Action and Uses.—Bismuth tannate acts as an astringent and intestinal sedative and is used in in the treatment of diarrhœa and dysentery. It is best **administered** in cachets or in glutoid capsules.

Dose.– 0·3 to 2 grammes (5 to 30 grains).

BISMUTHI TRIBROMPHENAS

(Bism. Tribromphen.)

Bismuth Tribromphenate

Bismuth tribromphenate may be prepared by adding a solution of bismuth nitrate to a solution of the sodium salt of tribromophenol, filtering off the precipitate, and washing with alcohol. It occurs as a yellow, tasteless, nearly odourless, impalpable, neutral powder. It is not decomposed on heating at temperatures below 120°, but is decomposed by alkalis.

Insoluble in water, alcohol and ether.

Standard.—Bismuth tribromphenate, determined by the method for bismuth in Bismuthi Subchloridum after a preliminary decomposition with sodium hydroxide and solution of the separated precipitate in hydrochloric acid, contains not less than 40·5 per cent. and not more than 49·5 per cent. of Bi. When boiled with sodium hydroxide solution and the liquid acidified, a white, curdy precipitate of tribromophenol is produced which, when washed and dried, melts between 90° and 95°. Arsenic limit, 2 parts per million. 5 millilitre portions of the filtrate obtained by igniting 3 grammes, dissolving the residue in 4 millilitres of nitric acid, evaporating to half its volume and diluting to 100 millilitres with water and then filtering, comply with the limit tests for lead, copper, silver, and alkalis and alkaline earths in Bismuthi Carbonas. 0·01 gramme treated with 1 millilitre of water and 5 millilitres of sulphuric acid, cooled, and 5 millilitres of ferrous sulphate solution carefully superimposed, shows no red or brown zone within five minutes (limit of nitrate). On the addition of hydrochloric acid there is no effervescence (limit of carbonate). Shake 1 gramme with 30 millilitres of alcohol, filter and wash twice with 10 millilitres of alcohol, add excess of N/10 sodium hydroxide and titrate with N/10 hydrochloric acid, using phenolphthalein as indicator; the alcoholic solution requires not more than 1 millilitre of N/10 sodium hydroxide (limit of free tribromophenol).

Action and Uses.—Bismuth tribromphenate is a non-irritating and non-toxic antiseptic. It is given internally in gastro-intestinal catarrh, dysentery, infantile cholera, and diarrhœa. It has been recommended as a substitute for iodoform. It may be **administered** in cachets.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

BISMUTHI PHENAS.—Bismuth phenate may be prepared by adding slowly, with constant stirring, a solution of bismuth subnitrate in nitric acid diluted with water, to a solution of sodium hydroxide and phenol, the precipitate being washed with cold water and dried. It should contain at least 10 per cent. of phenol, but some samples examined have contained practically none. It occurs as a light, amorphous powder which is insoluble in water or alcohol. Bismuth phenate has been used as an intestinal antiseptic and occasionally as a dusting powder. Dose.–0·3 to 1·2 grammes (5 to 20 grains).

BISMUTHUM PRÆCIPITATUM
(Bism. Præcip.)
Precipitated Bismuth

Precipitated bismuth is finely divided metallic bismuth and may be prepared by the reduction of a solution of bismuth trichloride in hydrochloric acid by means of hypophosphorous acid. It occurs as a dull grey powder which is readily diffused when shaken with water and contains no particles larger than 15 microns in diameter.

Insoluble in water.

Standard, B.P.—Precipitated bismuth contains not less than 98·5 per cent. of metallic bismuth. Arsenic limit, 10 parts per million. It complies also with the limit tests for impurities in Bismuthi Carbonas.

Action and Uses.—Bismuth and its compounds are among the few drugs which are effective in the treatment of syphilis, neurosyphilis, cardiovascular syphilis and congenital syphilis. There is general agreement that bismuth is not so potent as the arsphenamines, but many consider that it exercises a more favourable influence than mercury. In certain cases of active syphilis in which the arsphenamines have proved ineffective, bismuth has often a beneficial effect. It may also be administered in cases in which injections of arsphenamines are not tolerated. It is accepted by most workers that the combination of arsphenamines and bismuth is more powerful as an anti-syphilitic than any other combination. Bismuth and mercury should not be used concurrently in the same case as they act in a similar manner on the tissues and are apt to produce intolerance and side-effects such as stomatitis and nephritis.

Bismuth does not act so rapidly as the arsphenamines in killing the organism of syphilis in the early stages of infection; this may be due to the fact that it is administered intramuscularly and as a result is more slowly absorbed. Continued administration of bismuth results in the disappearance of the primary sore of syphilis, the skin lesions on the surface of the body and on the mucous membranes, and the later manifestations of syphilis on the skin and elsewhere. It exercises a beneficial effect on the serological reactions (Wassermann test) of the blood in most cases of syphilis and especially in the earlier cases. If administered before the Wassermann reaction has become positive, that is, in serum-negative syphilis, and if its administration is continued over a sufficiently long period and in therapeutic doses, very few cases will develop a positive reaction in the blood. In this respect it is apparently more powerful than mercurial preparations. The effect of bismuth on the positive Wassermann reaction is variable; if given alone it does not produce a negative reaction so rapidly as the arsphenamines, but is more rapid than the action of any mercurial preparation whether the latter is administered intravenously or intramuscularly. The most efficient and most rapid method of altering a strong positive

reaction is the concurrent administration of arsphenamine and bismuth. Arsphenamine and mercury are also efficient if administered concurrently, but are not so well tolerated.

Old and debilitated patients and those suffering from cardiovascular syphilis and enfeebled circulation, tolerate bismuth better than the arsphenamines, and in these cases its action does not appear so depressing as that of mercury. If administered in therapeutic doses and with appropriate intervals between each dose to allow for the elimination of the drug, it gives rise to few toxic symptoms. The chief toxic manifestations are gingivitis and stomatitis; these may be obviated by attending to the hygiene of the mouth from day to day during its administration. The first evidence of toxicity is a slight metallic taste and the appearance of a blue line at the junction of the tooth and the alveolar margin of the gum. If a rest from treatment is given for one or two weeks and sodium thiosulphate is administered intravenously in 10 per cent. solution (3 to 10 millilitres), the further advance of the gingivitis can be arrested. Bismuth stomatitis and gingivitis are rarely so severe as those due to mercury and are more easily controlled. Other toxic effects which may eventuate from continued bismuth treatment are albuminuria, urticarial eruptions, mild erythemata and loss of weight. These complications are rare if appropriate intervals are allowed between the successive doses.

In general, it may be said that bismuth, when administered intramuscularly, is less toxic that the arsphenamines administered intravenously or intramuscularly, and less toxic and painful than the administration of mercury. Bismuth administration can be continued for long periods with comparative safety. The average dose of precipitated bismuth is from 0·1 to 0·4 gramme per week. The best medium in which to suspend it is isotonic dextrose solution. It may be **administered** intramuscularly as Injectio Bismuthi, but should never be given intravenously since by this route it gives rise to toxic symptoms. Aqueous preparations of precipitated bismuth for **injection** may be sterilised by heating in an autoclave or by tyndallisation. Suspensions in oil may be prepared with olive oil or almond oil which has been sterilised by heating at 150° for one hour and allowed to cool. The final container is sterilised by heating at 100° for thirty minutes.

Dose.– 0·1 to 0·2 gramme (1½ to 3 grains), by intramuscular injection.

Preparation

Injectio Bismuthi, B.P.—(Inj. Bism.)—Injection of Bismuth. A sterile preparation containing precipitated bismuth, 20 per cent. w/v, with dextrose and cresol in re-distilled water. 1 millilitre contains 0·2 gramme, and 15 minims contains about 3 grains, of precipitated bismuth. Dose.– 0·5 to 1 millilitre (8 to 15 minims), by intramuscular injection.

BIXA
(Bixa)
Bixa

Synonyms—Annatto Seed; Bixa Seed.

Bixa consists of the seeds of *Bixa Orellana* Linn. (Fam. Bixaceæ), a shrub about ten feet in height, a native of tropical America, and cultivated extensively in the tropics.

The seed has the form of a triangular pyramid, two sides being broad and concave, while the third is narrower and bears a groove along which runs the raphe; the chalaza is in a depression at the broad end and the hilum is situated slightly to one side of the apex; the seed is about 5 millimetres long and 4 millimetres across the broad end. The testa is spongy, and varies in colour from brick-red to reddish-brown. Embedded in a starchy endosperm is a large embryo consisting of a radicle and two flat cotyledons, which are placed face to face with the apical portion folded over transversely at a right angle. The chloroform extractive of the unground seeds varies from about 3 to 11 per cent., and the colour of the solution indicates the quality of the drug.

Bixa **contains** bixin, a red colouring matter, and a fixed oil having a specific gravity of about 0·914 at 25°.

Uses.—Bixa is used for the production of anatta which is employed as a colouring agent for certain dairy products and various oils and fats, and as a dye for silk and other fabrics.

BOLDO
(Boldo)
Boldo

Synonyms—Boldo Folia; Boldo Leaves.

Boldo consists of the dried leaves of *Peumus Boldus* Molina (Fam. Monimiaceæ), a dicœcious evergreen tree indigenous to the Central Provinces of Chili.

The leaves are about 3 to 8 centimetres long and 2 to 4 centimetres broad, ovate or oblong-ovate; shortly petiolate, greyish-green, coriaceous and brittle. The margin is entire and slightly revolute, the apex obtuse, and the midrib and veins prominent on the under surface; both surfaces have protuberances crowned with groups of hairs. The odour is aromatic, camphoraceous and pungent, and the taste bitter.

The diagnostic **microscopical** features are the stellate groups of about four to eight, thick-walled, unicellular hairs on both surfaces; the upper epidermis consisting of thick-walled, polygonal cells with straight or slightly wavy walls; a hypoderma of thick-walled cells one deep, but here and there two or three cells deep; the lower epidermis with

numerous, slightly raised stomata surrounded by thick-walled, polygonal, epidermal cells with slightly wavy walls; a mesophyll showing two layers of palisade cells with brownish contents; the spongy parenchyma of loosely arranged cells with large, sub-spherical idioblasts containing volatile oil. Calcium oxalate crystals are absent.

Boldo **contains** about 2 per cent. of volatile oil (specific gravity, 0 915 to 0·945; optical rotation + 2° 25′ to — 1° 40′; refractive index, 1·4777), in which, in addition to terpenes, terpineol has been detected. The leaves also contain the alkaloid, boldine (0·1 per cent.), and the glycoside, boldin or boldoglucin. It yields about 10 per cent. of ash.

Substitute.—The leaves of *Cryptocarya Peumus* Nees (Fam. Lauraceæ) are distinguished by the absence of hairs, the wavy margin and the darker colour.

Standard.—Boldo contains not more than 2 per cent. of petioles, stem and other foreign organic matter. Acid-insoluble ash, not more than 6 per cent.

Boldo, in powder (Pulvis Boldo : Pulv. Boldo), contains the constituents and possesses the diagnostic microscopical characters of Boldo, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Boldo possesses diuretic and stimulant properties due to the volatile oil which it contains. The leaves are employed in Chili and other South American countries for chronic hepatic congestion and as an aromatic tonic and diuretic in gonorrhœa, and in cystitis and other bladder affections. Boldine has been recommended for use as a hypnotic; also, in doses of 0·0006 to 0·003 gramme ($\frac{1}{100}$ to $\frac{1}{20}$ grain), combined with mercurous chloride, for liver congestion. It has weak local anæsthetic properties. Boldoglucin also possesses hypnotic properties and has been given internally in capsules containing 0·2 gramme (3 grains). Boldo is now used principally in the form of tincture, as a diuretic and supposed liver stimulant.

Preparation

Tinctura Boldo, B.P.C.—(Tinct. Boldo)—Tincture of Boldo. 1 in 10. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

BORAX

(Borax)

Borax

$Na_2B_4O_7,10H_2O = 381·4$

Synonyms—Borax Purificatus; Purified Borax; Sodium Borate; Sodium Pyroborate.

Borax is obtained by the purification of naturally occurring borax, or from native calcium borates by double decomposition with sodium carbonate solution. It occurs as transparent, colourless crystals or as a white powder and has an alkaline reaction; it is without odour and has a sweetish, saline, alkaline taste. On exposure to dry air, borax

effloresces, and becomes anhydrous on ignition. It gives the colouration with turmeric paper described under boric acid, and a mixture of borax, sulphuric acid and alcohol burns with a flame tinged with green.

Soluble in water (1 in 25), boiling water (2 in 1) and glycerin (1 in 1); insoluble in alcohol (90 per cent.).

Standard, B.P.—Borax contains not less than 99 per cent. and not more than the equivalent of 103 per cent. of $Na_2B_4O_7, 10H_2O$. Arsenic limit, 5 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for chloride, sulphate and iron.

Action and Uses.—Borax is a mild antiseptic, its action in this respect resembling that of boric acid, and it also possesses slight antacid properties. It is used **internally** alone, but generally in combination with the bromides, in cases of epilepsy. It is administered in mixtures flavoured with syrup of orange, and in lozenges and pastilles. Applied **externally,** borax has a sedative action and, as a lotion, is used for inflammatory conditions of the skin. It also exercises a cleansing effect upon the scalp when used as a hair wash. Compresses of a saturated solution are useful in the treatment of gouty affections. It is employed in gargles for aphthæ and stomatitis, in lotions for pruritus ani, for fœtid sweating (1 in 40) and for inflammatory conditions of the eye (1 in 100). Glycerinum Boracis is used as a paint for the tongue and throat, especially in children; Mel Boracis is applied to the mouth in aphthous conditions. Borax is **incompatible** with mucilage of acacia and precipitates many alkaloids, including cocaine, from solutions of their salts. Its use as a food preservative is now prohibited. Borax is preferable to sodium carbonate for preparing solutions for sterilising surgical instruments by boiling. It is also used as an insecticide.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Glycerinum Boracis, B.P.—(Glycer. Borac.)—Glycerin of Borax. Borax, 12 per cent. w/w, dissolved in glycerin. It has an acid reaction. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Liquor Alkalinus, B.P.C.—(Liq. Alk.)—Alkaline Solution. *Syn.*—Collunarium Alkalinum; Alkaline Nasal Wash. Sodium bicarbonate and borax, of each 1·5 per cent. w/v, with phenol and sucrose in distilled water.

Liquor Boracis Compositus, B.P.C.—(Liq. Borac. Co.)—Compound Solution of Borax. *Syn.*—Collunarium Acidi Carbolici Compositum; Dobell's Solution. Borax and sodium bicarbonate, of each, 1·5 per cent. w/v, with phenol, glycerin and distilled water.

Mel Boracis, B.P.—(Mel. Borac.)—Honey of Borax. *Syn.*—Borax Honey; Borax and Honey. Borax, 10 per cent. w/w, dissolved in glycerin and purified honey.

Pulvis Boracis Compositus, B.P.C.—(Pulv. Borac. Co.)—Compound Borax Powder. *Syn.*–Pulvis Alkalinus Compositus; Compound Alkaline Powder. Sodium bicarbonate, sodium chloride and borax, equal parts.

Pulvis Sodii Chloridi Compositus, B.P.C.—(Pulv. Sod. Chlorid. Co.)—Compound Powder of Sodium Chloride. Sodium bicarbonate, sodium chloride, borax and sucrose, equal parts.

Solvellæ Antisepticæ, B.P.C.—(Solv. Antisep.)—Antiseptic Solution-Tablets. *Syn.*—Effervescing Mouth-wash Tablets. Each tablet contains 3 grains of borax with sodium benzoate, boric acid, menthol, oil of eucalyptus, thymol, oil of lemon, saccharin and lactose, with sodium bicarbonate and tartaric acid, and coloured with eosin and carmine.

Solvellæ Boracis Compositæ, B.P.C.—(Solv. Borac. Co.)—Compound Solution-Tablets of Borax. Each tablet contains 5 grains of borax, 2½ grains of sodium chloride, $\frac{1}{20}$ grain of thymol and 2½ grains of sodium bicarbonate.

Solvellæ Boracis et Benzaminæ Compositæ, B.P.C.—(Solv. Borac. et Benzamin. Co.)—Compound Solution-Tablets of Borax and Benzamine. *Syn.*—Naso-Pharyngeal Solution-Tablets. Each tablet contains 5 grains of sodium chloride, 3 grains of borax, 1 grain of boric acid, ½ grain of sodium benzoate and ¼ grain of benzamine hydrochloride, with menthol, thymol and oil of sweet birch.

Solvellæ Boracis et Cocainæ Compositæ, B.P.C.—(Solv. Borac. et Cocain. Co.)—Compound Solution-Tablets of Borax and Cocaine. Each tablet contains 5 grains of sodium chloride, 3 grains of borax, 1 grain of boric acid, ½ grain of sodium benzoate and $\frac{1}{12}$ grain of cocaine hydrochloride, with menthol, thymol and oil of sweet birch.

Tabellæ Potassii Chloratis et Boracis, B.P.C.—(Tab. Pot. Chlorat. et Borac.)—Tablets of Potassium Chlorate and Borax. Each tablet contains 3 grains of potassium chlorate and 2 grains of borax. Dose.—1 or 2 tablets.

BROMOFORMUM

(Bromof.)

Bromoform

$CHBr_3 = 252{\cdot}8$

Bromoform is tribromomethane containing about 4 per cent. of alcohol and may be prepared by the action of bromine, in the presence of an alkali, on ethyl alcohol, industrial methylated spirit or acetone. It is decomposed by light and air, and the addition of a little alcohol acts as a preservative. Bromoform occurs as a colourless, heavy liquid, with an odour resembling that of chloroform, and a sweetish taste. It is not inflammable, but the vapour introduced into a bunsen flame produces a green colour. It should be **stored** protected from light.

Soluble in water (1 in 800) and glycerin (about 1 in 80); miscible with alcohol, ether, benzene, fixed and volatile oils.

Standard.—Bromoform has a specific gravity of about 2·63. Residue on evaporation, not more than 0·05 per cent. Not more than 10 per cent. w/w distils below 147°, and the remainder between 148° and 155°. On shaking 10 millilitres of bromoform with 10 millilitres of water, and allowing to separate, the aqueous layer is neutral to litmus (limit of free acid), does not show more than a slight opalescence with silver nitrate solution (limit of bromides and other bromine compounds), and does not develop a blue colour on the addition of solution of potassium iodide and mucilage of starch (limit of free bromine). When shaken with an equal volume of sulphuric acid for ten minutes both the acid and the bromoform remain colourless.

Action and Uses.—Bromoform, although possessing general anæsthetic properties similar to those of chloroform, is not sufficiently volatile for inhalation. It is used chiefly in whooping cough and may be **administered** in the form of elixir, compound syrup, or dissolved in oil in capsules. On account of its high density and low solubility in water, bromoform is not satisfactory for exhibition in aqueous liquids, but it may be dissolved in oil and emulsified with acacia. Cases of **poisoning** in children have resulted from the use of bromoform; the symptoms closely resemble those of chloroform poisoning, but they are more prolonged. In such cases the stomach pump should be used and artificial respiration resorted to if necessary; although the symptoms are alarming, they are seldom followed by fatal results.

Dose.– 0·03 to 0·12 millilitres ($\frac{1}{2}$ to 2 minims).

Preparations

Elixir Bromoformi, B.P.C.—(Elix. Bromof.)—Bromoform Elixir. *Syn.*—Mistura Bromoformi Composita; Compound Mixture of Bromoform. Bromoform, 1 in 50, with alcohol (90 per cent.), tincture of orange, compound tincture of cardamom and glycerin. Dose.– 2 to 8 millilitres ($\frac{1}{2}$ to 2 fluid drachms).

Syrupus Bromoformi Compositus, B.P.C.—(Syr. Bromof. Co.)—Compound Syrup of Bromoform. Each fluid drachm contains about $\frac{1}{11}$ minim of bromoform, $\frac{1}{8}$ grain of codeine and $\frac{1}{8}$ minim of tincture of aconite, with spirit of bitter almond, alcohol (90 per cent.), cherry-laurel water, glycerin, syrup of red poppy and syrup of tolu. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

BROMUM
(Brom.)
Bromine
Br = 79·92

Bromine is a liquid non-metallic element which does not occur free in nature. It is chiefly obtained from the saline deposits of Stassfurt in Europe and from the brines of Virginia and Michigan in America. It occurs as a dark red-brown, heavy, mobile liquid, giving off brown fumes with an intensely irritating odour. Specific gravity, about 3·14. Bromine should be handled with great care since it causes severe burns and blisters when brought into contact with the skin. It should be **stored** in glass-stoppered bottles, in a cool place.

Soluble in water (1 in 30, by weight); readily soluble in alcohol, ether, chloroform, carbon disulphide and glycerin, with gradual decomposition of the solvents.

Standard.—Bromine contains not less than 99 per cent. of Br. Arsenic limit, 5 parts per million. A solution of 0·3 gramme in 10 millilitres of water, when shaken with 1 gramme of reduced iron until nearly colourless and filtered, does not develop a blue colour on the addition of 1 millilitre of starch mucilage and 1 millilitre of ferric chloride solution and allowing to stand for ten minutes (limit of iodine). 3 grammes

combines with 50 millilitres of sodium hydroxide solution to form a permanently clear liquid without the separation of oily drops (limit of organic bromine compounds). Dissolve 1 gramme in 10 millilitres of solution of ammonia and add 65 millilitres of water followed by 25 millilitres of nitric acid; bring to vigorous boiling and completely expel the bromine by passing a rapid current of air through the solution for twenty minutes while cooling; the residual liquid requires not more than 1·4 millilitres of N/10 silver nitrate for complete precipitation (limit of chloride).

Assay.—Weigh accurately about 0·2 gramme into 35 millilitres of potassium iodide solution, titrate with N/10 sodium thiosulphate using starch mucilage as indicator, and correct for the amount of chloride present as determined in the limit test for chloride; each millilitre of N/10 sodium thiosulphate is equivalent to 0·007992 gramme of Br.

Action and Uses.—Bromine closely resembles chlorine in its action and is a powerful disinfectant owing to its oxidising properties. It is not given internally in the uncombined state. **Externally** it has been used as a lotion for chronic ulcers in the proportion of 30 minims to 1 pint of water. In cases of **poisoning,** milk, white of egg or starch mucilage should be given.

BRYONIA

(Bryon.)

Bryony

Synonym—English Mandrake.

Bryony is the root obtained from *Bryonia dioica* Jacq. or *B. alba* Linn. (Fam. Cucurbitaceæ), climbing plants with perennial roots, growing in hedges and thickets in England and the European continent. It is collected in the autumn and is used both in the fresh or dried condition.

The fresh root is usually large and nearly cylindrical, generally simple, but occasionally branching into two, the diameter at the upper extremity being from 5 to 15 centimetres. Externally, it is greyish-yellow and marked at close intervals with prominent, transverse, corky ridges often extending half round the root, giving it a wrinkled appearance. Internally, it is white and fleshy, exuding, when cut, a juice which appears milky from the presence of numerous, minute starch grains. The transversely cut surface exhibits a fine line, the cambium, separating a narrow bark from a large parenchymatous xylem, which contains small groups of vessels arranged in concentric zones. The fresh root has an unpleasant odour, and an acrid and bitter taste; the dried root is odourless, but has a similar taste. When dried, the root is usually cut transversely to form disc-shaped pieces which are about 5 centimetres in diameter and 5 millimetres in thickness; they are hard and brittle

and have a thin, yellowish-grey cork and a whitish ring of porous wood, marked with concentric rings.

Bryony **contains** an amorphous, brownish-yellow, bitter, alkaloidal principle, and a dark brown, viscid resin, of which the dried root contains about 2 per cent., and from which can be isolated a phytosterol, a dihydric alcohol (bryonol), and a mixture of fatty acids. Other constituents are an essential oil, an amorphous, bitter glycoside which yields a brown resin on hydrolysis, a crystalline neutral substance, and an enzyme which slowly hydrolyses the glycosidal constituent, and can also effect the hydrolysis of amygdalin and salicin. The fresh root contains about 75 per cent. of moisture.

Standard.—Bryony contains not more than 2 per cent. of foreign organic matter.

Action and Uses.—Bryony is administered as Tinctura Bryoniæ to allay cough in pleurisy and phthisis; large doses are purgative in action. In cases of **poisoning** the stomach should be emptied and demulcent drinks given, the patient being kept warm.

BLACK BRYONY is the fresh root of *Tamus communis* Linn. (Fam. Dioscoreaceæ); this root is smaller, dark brown externally, and free from bitterness.

Preparation

Tinctura Bryoniæ, B.P.C.—(Tinct. Bryon.)—Tincture of Bryony. 1 in 10. Dose.—0·06 to 0·6 millilitre (1 to 10 minims).

BUCHU
(Buchu)

Buchu

Synonyms—Buchu Folia; Buchu Leaves.

Buchu consists of the dried leaves of *Barosma betulina* (Thunb.) Bartl. and Wendl. (Fam. Rutaceæ), a small, shrubby plant indigenous to Cape Colony. The leaves are collected while the plant is flowering and fruiting.

The leaves vary in length from 12 to 20 millimetres; they are bright green to yellowish-green in colour, rigid, coriaceous, and rhomboid-ovate in outline. The margin is sharply denticulate in the apical half but serrulate in the basal half, an oil gland being situated at the base of each indentation; oil glands are also scattered throughout the mesophyll, giving rise to small prominences upon the surface, which is glabrous except at the base and upon the short petiole which bear a few unicellular trichomes. The apex is blunt, strongly recurved and contains an oil gland. The odour is strong and characteristic, especially when the leaves are crushed; the taste is strong and aromatic.

The diagnostic **microscopical** characters are the polygonal, straight-walled, epidermal cells of both surfaces, containing mucilage, which stains with ruthenium red, and sphæro-crystalline masses of diosmin;

the short, conical, unicellular, thick-walled, warty trichomes; the oil glands and idioblasts of the mesophyll, the latter containing cluster-crystals of calcium oxalate; the stomata on the lower surface only, some of them exceeding 38 microns in length (distinction from *B. crenulata* and *B. serratifolia*).

Buchu **contains** about 1·3 to 2 per cent. of volatile oil which, on cooling, deposits about 30 per cent. of diosphenol, $C_{10}H_{16}O_2$, a crystalline and optically inactive substance, boiling at 232° with partial decomposition; other constituents of the oil are *d*-limonene, dipentene and menthone. The drug also contains mucilage and yellow sphærocrystals of diosmin. It yields to alcohol (20 per cent.) from 22 to 26 per cent. of extractive.

Substitutes.—In addition to the "short" or "round" buchu from *B. betulina*, two other varieties of the drug are imported, viz., "long" buchu and "oval" buchu. "Long" buchu leaves [*B. serratifolia* (Curt.) Willd.] may be distinguished by their greater length (2·5 to 3·0 centimetres), linear-lanceolate shape, serrate margin, and truncate apex; they contain numerous oil glands, one being situated in the apex. The constituents are similar to those of the official variety, with the exception that they contain no diosphenol; "oval" buchu leaves [*B. crenulata* (Linn.) Hook.] are rather broader that the "long" buchu, varying in outline from lanceolate to oval-oblong ; the apex is not recurved. They yield about 1·6 per cent. of volatile oil which, like that of buchu, contains diosphenol. Leaves of other species of *Barosma* are occasionally imported and offered as buchu, one of the more important being *B. Bathui* Dummer, the leaves of which have a thickened, crenate margin and an apex which is devoid of an oil gland.

Standard, B.P.—Buchu contains not more than 5 per cent. of its stems and not more than 2 per cent. of other foreign organic matter. Ash, not more than 5 per cent.

Buchu, in powder (Pulvis Buchu : Pulv. Buchu), contains the constituents and possesses the diagnostic microscopical characters of Buchu, and complies with the limit for ash of the unground drug.

Action and Uses.—Buchu is a diuretic and urinary antiseptic; it is used principally in inflammatory conditions of the urinary organs such as cystitis, pyelitis, vesical irritation and gonorrhœa. It is **administered** with other diuretics and genito-urinary antiseptics, notably the citrates, acetates, benzoates, hexamine and cubeb. It is given preferably in the form of fresh infusion; the liquid extract is preferable to the tincture when only a small quantity of alcohol is desired.

Dose.– 1 to 2 grammes (¼ to ½ drachm).

Preparations

Extractum Buchu Liquidum, B.P.C.—(Ext. Buchu Liq.)—Liquid Extract of Buchu. 1 in 1. Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

Infusum Buchu Concentratum, B.P.—(Inf. Buchu Conc.)—Concentrated Infusion of Buchu. Buchu, 1 in 2½, extracted with alcohol (25 per cent.). This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of buchu and differs also in containing a small proportion of alcohol. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

A concentrated infusion, prepared with dilute chloroform water, alcohol (90 *per cent.*) *and tincture of buchu, was included in the British Pharmaceutical Codex*, 1923.

Infusum Buchu Recens, B.P.—(Inf. Buchu Rec.)—Fresh Infusion of Buchu. 1 in 20. Dose.– 30 to 60 millilitres (1 to 2 fluid ounces).

Tinctura Buchu, B.P.C.—(Tinct. Buchu)—Tincture of Buchu. 1 in 5. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

BUTEÆ GUMMI
(But. Gum.)
Butea Gum

Synonym—Bengal Kino.

Butea gum is a dried, astringent juice obtained from incisions made in the stem of *Butea frondosa* Roxb. (Fam. Leguminosæ), a tree indigenous to India.

The gum occurs in small, irregular, angular fragments, to one side of which dull, buff-coloured portions of the cork and cortex of the stem sometimes adhere. When fresh it is brittle, vitreous, ruby-red in colour, and transparent in small fragments, but on keeping it becomes tougher, dull, opaque and nearly black; it is readily reduced to a reddish powder. The taste is astringent. It is partially **soluble** in water and yields about 40 per cent. to alcohol, the solution being scarcely coloured. The chief constituent is kinotannic acid.

Action and Uses.—Butea gum possesses astringent properties and may be used for similar purposes to kino. It is used in India and the Eastern Colonies as a substitute for East Indian, Malabar, Madras or Cochin kino.

BUTEÆ SEMEN
(But. Sem.)
Butea Seed

Synonym—Palas-papra.

Butea seed consists of the seeds of *Butea frondosa* Roxb. (Fam. Leguminosæ), a tree indigenous to India.

The seeds are flat and reniform, from 25 to 38 millimetres long, 16 to 25 millimetres wide and 1·5 to 2 millimetres thick; the seed coat is dark reddish-brown in colour, thin, glossy-veined and wrinkled, enclosing two large, yellowish, leafy cotyledons; the hilum is conspicuous and situated near the middle of the concave edge of the seed. The odour is faint and the taste slightly acrid and bitter.

Butea **contains** about 18 per cent. of fixed oil; 19 per cent. of albuminoid substances and sugars. The ash averages about 5 per cent.

Action and Uses.—Butea seed possesses aperient properties and is used in India and the Eastern Colonies as an anthelmintic in the form of Pulvis Buteæ Seminum which is prepared by soaking the seed in distilled water, carefully removing the integuments, drying and powdering the kernels.

Dose.– 0·6 to 1·2 grammes (10 to 20 grains).

BUTYLCHLORALIS HYDRAS

(Butylchloral. Hydr.)

Butylchloral Hydrate

$C_4H_7O_2Cl, = 193·4$

Synonym—Croton-chloral Hydrate.

Butylchloral hydrate is trichlorobutylidene glycol, $CH_3 \cdot CHCl \cdot CCl_2 \cdot CH(OH)_2$, and may be obtained by passing dry chlorine into aldehyde or paraldehyde cooled to about −10°, until the aldehyde is saturated, and then continuing the current of chlorine and gradually increasing the temperature to about 100°. The product is washed with sulphuric acid, submitted to fractional distillation, and the portion distilling at 163° to 165° collected. This is mixed with one-ninth its weight of water, and the solidified mass crystallised from boiling water. It occurs in pearly-white, trimetric laminæ, with a pungent, but not acrid, odour and a nauseous, bitter taste. Melting-point, about 78°, forming a clear liquid which commences to solidify at about 71°. Globules of butylchloral alcoholate are precipitated from a solution in alcohol by the gradual addition of water.

Soluble in water (1 in 40), glycerin (1 in 1 by weight), alcohol (5 in 3) with combination, chloroform (1 in 20), olive oil (1 in 20) and ether (1 in 2).

Standard.—Butylchloral hydrate yields not more than 0·05 per cent. of ash. The aqueous solution (2 per cent. w/v) is neutral or only slightly acid to litmus and gives no precipitate or opalescence with silver nitrate solution (limit of chloride). 0·5 gramme gently heated with 10 millilitres of sodium hydroxide solution and 3 drops of a saturated aqueous aniline solution, gives a mixture which, when shaken well and heated to boiling, does not develop the odour of phenylisocyanide (limit of chloral hydrate).

Action and Uses.—Butylchloral hydrate resembles chloral hydrate in its action although it is a weaker hypnotic and has a stronger depressant action on the heart. It may be used in place of chloral hydrate for sleeplessness not accompanied by pain. It is employed, often with camphor, phenazone, or gelsemium, as an analgesic for facial neuralgia or migraine. It is **administered** in mixtures, pills, or in cachets. It is **incompatible** with alkalis and alkaloids, and should not be dissolved in

alcohol with which it forms a water-insoluble alcoholate. In cases of **poisoning,** the procedure described under Chloralis Hydras should be followed.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

CAFFEINA

(Caffein.)

Caffeine

$C_8H_{10}O_2N_4,H_2O = 212·1$

Caffeine, methyltheobromine or 1 : 3 : 7-trimethylxanthine, is an alkaloid present in tea, coffee beans and kola seeds. It is prepared chiefly from tea waste or coffee and may be obtained synthetically from guanidine, or by methylating theobromine. When crystallised from water, caffeine contains one molecule of water of crystallisation, but it is anhydrous when crystallised from alcohol, chloroform, or ether. Caffeine occurs in colourless, silky, glistening needles, usually matted together. It is odourless and has a bitter taste. Caffeine is a very weak base, which is decomposed by strong solutions of caustic alkalis; its salts are decomposed by water, and an aqueous solution of the alkaloid itself is neutral to litmus. It effloresces on exposure to dry air and loses its water of crystallisation on being heated, becoming anhydrous at 100°; it sublimes at about 180°.

When a trace of caffeine is moistened with bromine water or treated with a crystal of potassium chlorate and moistened with hydrochloric acid, and the mixture evaporated to dryness, a reddish residue is obtained which changes to purple on exposure to ammonia vapour (murexide reaction). Caffeine gives no precipitate with potassio-mercuric iodide solution and is distinguished thereby from most other alkaloids except theobromine and theophylline. On the addition of tannic acid solution it yields a white precipitate soluble in excess of the reagent. No precipitate forms on the addition of N/10 iodine to an aqueous solution of caffeine, but on acidifying the mixture with a few drops of hydrochloric acid a brown precipitate is produced.

Soluble in water (1 in 80), boiling water (1 in 1), alcohol (90 per cent.) (1 in 40), chloroform (1 in 7), ether (1 in 400) and benzene; its solubility in water is increased by the addition of sodium benzoate or sodium salicylate.

Standard, B.P.—Caffeine, after drying at 100°, has a melting-point of 235° to 237°. Loss on drying at 105°, not more than 8·5 per cent. Ash, not more than 0·1 per cent. It complies also with limit tests for readily carbonisable substances and for other alkaloids.

Action and Uses.—Caffeine exerts three important actions—(1) on the central nervous system, (2) on muscle, including cardiac, (3) on the

kidneys. The action on the central nervous system is mainly on that part of the brain connected with psychical functions. It produces a condition of wakefulness and increased mental activity. The interpretation of sensory impressions is more perfect and correct, and thought becomes clearer and more rapid. With larger doses of caffeine the action extends from the psychical areas to the motor area and to the cord, and the patient becomes at first restless and noisy, and later may show convulsive movements. Caffeine facilitates the performance of all kinds of physical work, and actually increases the total work which can be obtained from a muscle. In the normal man, however, it is impossible to say how much of the action on the muscle is central and how much is peripheral, but, as fatigue shows itself first by an action on the centre, it is probable that the action of caffeine in diminishing fatigue is mainly central. Caffeine accelerates the pulse and slightly raises the blood pressure. It has no action in any way resembling that of digitalis; by increasing the irritability of cardiac muscle its prolonged use tends rather to fatigue than to rest the heart. Caffeine, theobromine and theophylline form a very important group of diuretics. The urine is generally of a lower specific gravity than normal, since it contains a lower proportion of salts and urea, but the total excretion of solids both as regards urea, uric acid and salts is increased. Caffeine, by exciting the medulla, produces an initial vasoconstriction of the kidneys, which tends at first to retard the flow of urine. On this account other drugs such as theobromine and theophylline which act on the kidneys in a similar manner, but are without the stimulant action on the brain, are usually preferred.

Caffeine has been recommended as an antidote to nicotine. It is employed as a cardiac and renal stimulant in cardiac failure, chronic nephritis and general dropsy, but is contra-indicated in acute renal inflammation. It is of great value in nervous headache and migraine, and is often given with acetanilide, acetylsalicylic acid, or phenacetin. It is frequently effectual in relieving the paroxysms of asthma. Caffeine is **administered** in the form of powders, cachets and tablets. Compound powders of caffeine with codeine, amidopyrine, phenacetin, quinine, or magnesium oxide are frequently prescribed. For hypodermic injection, caffeine and sodium benzoate or caffeine and sodium salicylate is commonly employed. In cases of **poisoning** by caffeine, an emetic should be administered, followed by the free use of stimulants and the application of warmth to the extremities. Morphine and atropine may be given hypodermically.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

Preparations

Pulvis Acetanilidi Compositus, B.P.C.—(Pulv. Acetanilid. Co.)—Compound Acetanilide Powder. Acetanilide, 7 parts; caffeine, 1 part; sodium bicarbonate, 2 parts. Dose.– 0·2 to 0·3 gramme (3 to 5 grains).

Tabellæ Acetanilidi Compositæ, B.P.C.—(Tab. Acetanilid. Co.)—Compound Tablets of Acetanilide. Each tablet contains 2 grains of acetanilide, ½ grain of caffeine and 1 grain of sodium bicarbonate. Dose.– 1 or 2 tablets.

Tabellæ Acetanilidi Compositæ cum Codeina, B.P.C.—(Tab. Acetanilid. Co. c. Codein.)—Compound Tablets of Acetanilide with Codeine. Each tablet contains 2 grains of acetanilide, ½ grain of caffeine, 1 grain of sodium bicarbonate and ⅛ grain of codeine. Dose.– 1 or 2 tablets.

Tabellæ Acidi Acetylsalicylici Compositæ, B.P.C.—(Tab. Acid. Acetylsalicyl. Co.)—Compound Tablets of Acetylsalicylic Acid. *Syn.*—Compound Aspirin Tablets. Each tablet contains 3½ grains of acetylsalicylic acid. 2½ grains of phenacetin and ½ grain of caffeine. Dose.– 1 or 2 tablets.

Tabellæ Acidi Acetylsalicylici et Caffeini, B.P.C.—(Tab. Acid. Acetylsalicyl. et Caffein.)—Tablets of Acetylsalicylic Acid and Caffeine. Each tablet contains 4 grains of acetylsalicylic acid and 1 grain of caffeine. Dose.– 1 to 3 tablets.

Tabellæ Phenacetini Compositæ, B.P.C.—(Tab. Phenacet. Co.)—Compound Phenacetin Tablets. Each tablet contains 4 grains of phenacetin and 1 grain of caffeine. Dose.– 1 or 2 tablets.

CAFFEINÆ CITRAS

(Caffein. Cit.)

Caffeine Citrate

$C_8H_{10}O_2N_4,C_6H_8O_7 = 386{\cdot}2$

Caffeine citrate is prepared by mixing 100 parts of caffeine with 100 parts of citric acid, moistening with 16 parts of distilled water and drying on a water-bath with constant stirring. It occurs as a white, odourless powder, having a bitter and acid taste, and an acid reaction. With three parts of water it forms a stiff paste which, if gently warmed, becomes a clear solution, and on cooling forms an almost solid mass of acicular crystals of caffeine. Treated with a crystal of potassium chlorate and a few drops of hydrochloric acid and evaporated to dryness, the residue is reddish and acquires a purple colour when exposed to the vapour of ammonia. A mixture of mercuric sulphate solution and a dilute solution of caffeine citrate heated to boiling produces a white precipitate on the addition of potassium permanganate solution.

Soluble in hot water (1 in 4), but dissociating on the further addition of water with separation of caffeine, which redissolves in 32 parts of water; soluble in alcohol (1 in 22) and in a mixture of 2 parts of chloroform and 1 part of alcohol (1 in 10).

Standard.—Caffeine citrate yields not less than 46 per cent. and not more than 51 per cent. of anhydrous caffeine, $C_8H_{10}O_2N_4$, calculated on the substance dried at 80°. Loss on drying at 80°, not more than 5 per cent. Ash, not more than 0·1 per cent.

Assay.—Dissolve about 1 gramme, accurately weighed, in 50 millilitres of water, add 10 millilitres of N/1 sodium hydroxide and extract the alkaloid with successive portions of chloroform until, on evaporating 1 millilitre of the chloroform extract, no residue remains. Wash the combined chloroform extracts with 2 millilitres of water, evaporate the chloroform and dry the residue of anhydrous caffeine at 100°.

Action and Uses.—Caffeine citrate has an action similar to that of the alkaloid. It may be **administered** in the form of effervescent granules or in cachets. Its solution contains free citric acid and therefore effervesces with alkali carbonates; it should be prescribed with acids rather than with alkalis. It is **incompatible** with a mixture of potassium iodide and spirit of nitrous ether, also with phenazone, sodium salicylate, benzoate, or nitrite. Caffeine alkaloid should be used for mixtures containing these substances.

Dose.– 0·12 to 0·6 gramme (2 to 10 grains).

Preparations

Caffeinæ Citras Effervescens, B.P.C.—(Caffein. Cit. Efferv.)—Effervescent Caffeine Citrate. About 1 in 25. Dose.– 4 to 8 grammes (1 to 2 drachms).

Effervescing caffeine citrate contains the same proportion of caffeine citrate as the corresponding preparation of the British Pharmacopœia, 1914, which was prepared with caffeine citrate, 4 grammes; tartaric acid, 27 grammes; citric acid, 18 grammes; sodium bicarbonate, 51 grammes; sucrose, 14 grammes.

Phenacetinum cum Caffeina Effervescens, B.P.C.—(Phenacet. c. Caffein Efferv.)—Effervescent Phenacetin with Caffeine. Phenacetin, about 1 in 20 and caffeine citrate, about 1 in 60. Dose.– 4 to 8 grammes (1 to 2 drachms).

Phenazonum cum Caffeina Effervescens, B.P.C.—(Phenazon. c. Caffein Efferv.)—Effervescent Phenazone with Caffeine. *Syn.*—Effervescent Antipyrin with Caffeine. Phenazone, about 1 in 12, and caffeine citrate, about 1 in 60. Dose.– 4 to 8 grammes (1 to 2 drachms).

Tabellæ Phenacetini et Caffeinæ Citratis, B.P.C.—(Tab. Phenacet. et Caffein Cit.)—Tablets of Phenacetin and Caffeine Citrate. Each tablet contains 4 grains of phenacetin and 1 grain of caffeine citrate. Dose.– 1 or 2 tablets.

CAFFEINA ET SODII BENZOAS

(Caffein. et Sod. Benz.)

Caffeine and Sodium Benzoate

Caffeine and sodium benzoate is a mixture of caffeine with sodium benzoate, and may be prepared by mixing equal weights of caffeine and sodium benzoate, moistening with either water or alcohol, and drying. It occurs in the form of a white, odourless powder, having a slightly bitter taste and a neutral reaction. It gives the reactions of caffeine and of sodium benzoate, and the former sublimes on the cooler portions of the tube when caffeine and sodium benzoate is heated cautiously in a dry tube. The caffeine can be extracted from the aqueous solution by adding sodium hydroxide and shaking with chloroform.

Soluble in water (1 in 4), warm water (about 1 in 1), part of the caffeine separating when the solution is cooled; slightly soluble in alcohol (90 per cent.).

Standard, B.P.—Caffeine and sodium benzoate contains not less than 47 per cent. and not more than 50 per cent. of anhydrous caffeine, $C_8H_{10}O_2N_4$, and not less than 50 per cent. and not more than 53 per cent. of sodium benzoate, $C_7H_5O_2Na$, both being calculated on the

substance dried at 105°. Loss on drying at 105°, not more than 5 per cent. The separated caffeine has a melting-point of 235° to 237° and the separated benzoic acid has a melting-point of 121° to 122°. It complies also with a limit test for acidity or alkalinity.

Action and Uses.—Caffeine and sodium benzoate is used hypodermically on account of its being readily soluble. Solutions of 1 part in 2 parts or more of sterilised water are used as a cardiac and respiratory stimulant or as a diuretic; a solution for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·3 to 1 gramme (5 to 15 grains), by the mouth; 0·12 to 0·3 gramme (2 to 5 grains), by injection.

CAFFEINA ET SODII SALICYLAS

(Caffein. et Sod. Salicyl.)

Caffeine and Sodium Salicylate

Caffeine and sodium salicylate is a mixture of caffeine with sodium salicylate and may be prepared by triturating equal weights of the two ingredients with sufficient water or alcohol to form a smooth paste and drying. It occurs in the form of an odourless, white, amorphous powder or granular mass, having a sweetish, bitter taste. Heated in a test-tube the salt evolves white vapours having the odour of phenol. A strong aqueous solution gives a crystalline precipitate of salicylic acid on the addition of hydrochloric acid; a diluted solution gives a violet colouration with ferric chloride (distinction from caffeine and sodium benzoate). The anhydrous caffeine obtained in the assay complies with the tests for identity described under Caffeina.

Soluble in water (1 in 1), and in alcohol (1 in 28).

Standard.—Caffeine and sodium salicylate, determined by the methods of the British Pharmacopœia for caffeine and for sodium benzoate in Caffeina et Sodii Benzoas, contains not less than 47 per cent. and not more than 50 per cent. of anhydrous caffeine, $C_8H_{10}O_2N_4$; and not less than 50 per cent. and not more than 53 per cent. of sodium salicylate, $C_7H_5O_3Na$, both being calculated on the substance dried at 105°; each millilitre of N/10 sodium hydroxide is equivalent to 0·01600 gramme of $C_7H_5O_3Na$. Loss on drying at 100°, not more than 5 per cent. It complies with the limit test for acidity or alkalinity for Caffeina et Sodii Benzoas.

Action and Uses.—Caffeine and sodium salicylate is used hypodermically in place of caffeine, being much more soluble than the alkaloid. Solutions containing 1 part in 2 or more parts of sterilised water are used as a cardiac and respiratory stimulant, or as a diuretic. Solutions of caffeine and sodium salicylate for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·3 to 1 gramme (5 to 15 grains), by the mouth; 0·12 to 0·3 gramme (2 to 5 grains), by injection.

CAFFEINÆ SALICYLAS.—Caffeine salicylate, $C_8H_{10}O_2N_4,C_7H_6O_3$, occurs as a white, crystalline powder which is less soluble in water than caffeine. It is useful in migraine associated with gout and rheumatism. Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

CAFFEINÆ HYDROBROMIDUM

(Caffein. Hydrobrom.)

Caffeine Hydrobromide

$C_8H_{10}O_2N_4,HBr,2H_2O = 311·1$

Caffeine hydrobromide may be prepared by dissolving caffeine in excess of warm, dilute hydrobromic acid, crystallising by careful evaporation, draining the resulting crystals and finally drying. It occurs in the form of large, transparent, colourless crystals, becoming coloured on exposure to the air, and losing part of its water of crystallisation. At 100° it becomes anhydrous, losing at the same time part of the hydrobromic acid; at 110° all the hydrobromic acid is driven off and caffeine remains.

Soluble in water (1 in 50), with decomposition into hydrobromic acid and caffeine; it is similarly decomposed by alcohol.

Standard.—Caffeine hydrobromide, determined by the method for Caffeinæ Citras, yields not less than 60 per cent. and not more than 63 per cent. of anhydrous caffeine, $C_8H_{10}O_2N_4$. Ash, not more than 0·1 per cent. Arsenic limit, 10 parts per million. Lead limit, 10 parts per million. 1 gramme complies with the limit test for sulphates.

Action and Uses.—Caffeine hydrobromide is employed principally in migraine and nervous headaches. It is **administered** in mixtures with potassium or sodium bromide, or in cachets.

Dose.– 0·06 to 0·25 gramme (1 to 4 grains).

CAFFEINÆ IODIDUM.—Caffeine iodide, $C_8H_{10}O_2N_4I_2,HI,H_2O$, occurs in the form of prismatic crystals, having a metallic lustre, steel-blue by reflected light, red by transmitted light, and is readily decomposed in moist air or by heating on a water-bath. By boiling with water, iodine is removed, and, on evaporation, crystals of hydriodide are formed. It is soluble in water, with slow decomposition, and in alcohol. Caffeine iodide is useful in gout and rheumatism and has been prescribed for relieving the paroxysms of asthma. Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

CAFFEINÆ VALERIANAS.—Caffeine valerianate, $C_8H_{10}O_2N_4,C_5H_{10}O_2$, occurs in the form of white crystals or powder, having a strong odour of valerian. The salt is very unstable and very easily decomposed, losing part of its valerianic acid even on drying, and is soluble in alcohol with decomposition. Commercially, however, it is generally a mixture of caffeine and valerianic acid in varying proportions, the best preparation of the kind being a combination of the two anhydrous

substances in the proportions of 4 and 1, respectively. Caffeine valerianate is used to relieve headache in hysterical conditions and is administered in pills. · Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

CALAMINA
(Calamin.)
Calamine

Synonyms—Calamina Præparata; Prepared Calamine.

Calamine is a basic zinc carbonate, with or without the addition of zinc oxide, suitably coloured with iron oxide. It is an amorphous, impalpable, pinkish powder, the shade depending upon the amount of iron oxide present and the process by which it is incorporated. When strongly heated it loses water and carbon dioxide, leaving a residue of zinc and iron oxides.

Insoluble in water.

Standard.—Calamine yields on ignition not less than 68 per cent. and not more than 90 per cent. of residue. It dissolves almost completely in warm, dilute hydrochloric acid, leaving not more than 1 per cent. of residue (limit of insoluble matter). Shaken with water and filtered, the filtrate is colourless (absence of water-soluble dyes). Dissolve 2 grammes in 20 millilitres of water and 5 millilitres of glacial acetic acid; the solution remains clear on the addition of 5 drops of potassium chromate solution (limit of lead). Dissolve 1 gramme in 10 millilitres of water and 2·5 millilitres of glacial acetic acid; no turbidity is produced on the addition of ammonium oxalate solution (limit of calcium and soluble barium salts).

Action and Uses.—Calamine is a common constituent of dusting powders, lotions and ointments, and is used as a mild astringent for roughness and redness of the skin and irritable eczematous conditions. The colour of calamine lotions may be varied for individual requirements by the addition of small quantities of suitable colouring matter. Linimentum Calaminæ is a soothing application in eczema and irritable conditions of the skin, and is sometimes used in place of carron oil for burns. Lotio Calaminæ is a useful application for relieving the pain and swelling caused by sunburn.

Preparations

Linimentum Calaminæ, B.P.C.—(Lin. Calamin.)—Liniment of Calamine. Calamine, about 1 in 25, and zinc oxide, about 1 in 30, with wool fat, oleic acid, liquid paraffin and solution of calcium hydroxide.

Linimentum Calaminæ Compositum, B.P.C.—(Lin. Calamin. Co.)—Compound Liniment of Calamine. Calamine, 1 in 10, with zinc oxide, zinc oleostearate, wool fat, white soft paraffin and liquid paraffin.

Lotio Calaminæ, B.P.C.—(Lot. Calamin.)—Calamine Lotion. Calamine, 1½ in 10, and zinc oxide, 1 in 20, with glycerin and rose water.

Unguentum Calaminæ, B.P.C.—(Ung. Calamin.)—Calamine Ointment. Calamine, about 16 5 per cent., in yellow soft paraffin.

CALAMUS
(Calam.)
Calamus

Synonyms—Calamus Rhizome; Sweet Flag Root.

Calamus is the dried rhizome of *Acorus Calamus* Linn. (Fam. Araceæ), a plant indigenous to Eastern Europe and Central Asia, but widely diffused by cultivation, growing wild in England. The rhizome is collected in the autumn, trimmed, and sometimes scraped or peeled.

The rhizome occurs in sub-cylindrical pieces from about 5 to 15 centimetres long and about 1 to 2 centimetres in diameter. The unpeeled rhizomes are covered with a thin, brownish epidermis, and are much shrunken and deeply wrinkled longitudinally; they bear, on the upper surface, large, encircling, triangular leaf-scars and, on the under surface in irregular zigzag lines, closely approximated, raised, circular root-scars. The scraped rhizome is of a pale brownish-buff colour, and the scars are less conspicuous. Calamus breaks with a short, mealy fracture and is nearly white, starchy and spongy internally. The transversely cut surface shows a large stele separated from the cortex by the endodermis, which is evident as a yellowish line. The whole transverse surface exhibits numerous small, scattered, vascular bundles. The odour is sweet and aromatic, and the taste is bitter and pungent.

Calamus **contains** a bitter, aromatic, volatile oil which is present to the extent of 1·5 to 3·5 per cent. The drug also contains starch, tannin, and a bitter, amorphous principle, acorin, which yields acoretin by oxidation. The chief aromatic constituent of the volatile oil is asaryl alcohol; eugenol, asarone and other bodies have also been identified. Calamus yields to alcohol (70 per cent.) about 20 per cent. of extractive.

Action and Uses.—Calamus has the action of an aromatic bitter. On account of the volatile oil which is present it also acts as a carminative, removing the discomfort caused by flatulence. It is used to increase the appetite and benefit digestion, and may be **administered** in the form of infusion (Infusum Calami, 1 to 10; dose, ½ to 1 fluid ounce) or tincture (Tinctura Calami, 1 in 5; dose, ½ to 1 fluid drachm).

Dose.– 1 to 4 grammes (¼ to 1 drachm).

CALCII ACETYLSALICYLAS
(Calc. Acetylsalicyl.)
Calcium Acetylsalicylate

$C_{18}H_{14}O_8Ca,2H_2O = 434{\cdot}2$

Calcium acetylsalicylate, $(CH_3CO{\cdot}OC_6H_4{\cdot}COO)_2Ca,2H_2O$, may be prepared by suspending calcium hydroxide in alcohol and adding acetylsalicylic acid, when the salt separates as a coagulated mass, which is washed with alcohol and dried at 40° to 60°. It occurs as a

white, non-hygroscopic powder. In aqueous solution it becomes hydrolysed, with formation of calcium salicylate and acetic acid. It decomposes rapidly in moist air and should be **stored** in well-stoppered containers.

Soluble in water (1 in 6) and alcohol (1 in 800).

Standard.—Calcium acetylsalicylate, determined by the method of the British Pharmacopœia for Calcii Lactas, contains not less than 95 per cent. of $C_{18}H_{14}O_8Ca,2H_2O$; 1 gramme of residue is equivalent to 3·190 grammes of $C_{18}H_{14}O_8Ca,2H_2O$. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million.

Action and Uses.—The action of calcium acetylsalicylate is essentially that of acetylsalicylic acid. On account of its gradual hydrolysis in aqueous solutions it is best **administered** in powders or cachets. It is incompatible with mineral acids, iron and quinine salts, carbonates, phosphates and sulphates. Calcium acetylsalicylate has also been used by intravenous injection in the treatment of rheumatic affections.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

CALCII BROMIDUM

(Calc. Brom.)

Calcium Bromide

$CaBr_2,2H_2O = 235·9$

Calcium bromide may be prepared by neutralising calcium carbonate with hydrobromic acid, or by the action of calcium hydroxide on solution of iron bromide. The hexahydrate, $CaBr_2,6H_2O$, which crystallises from aqueous solution, is converted into the dihydrate, $CaBr_2,2H_2O$, by heating to about 180°. It occurs as a white, or nearly white, odourless, very deliquescent, granular salt having a sharp saline and bitter taste. It melts and decomposes at a red heat with evolution of bromine. It should be **stored** in well-stoppered bottles.

Soluble in water (10 in 3) and alcohol (5 in 3).

Standard.—Calcium bromide, determined by the method of the British Pharmacopœia for Potassii Bromidum, contains not less than 98 per cent. of $CaBr_2,2H_2O$; each millilitre of N/10 silver nitrate is equivalent to 0·0118 gramme of $CaBr_2,2H_2O$. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies with the limit test for chloride in Potassii Bromidum. Pour 1 millilitre of dilute sulphuric acid on 1 gramme of the powdered salt; no yellow colour is produced immediately (limit of bromate). A solution of 1 gramme with 1 gramme of sodium acetate, slightly acidified with acetic acid, after boiling, cooling, and shaking with a few drops of potassium dichromate solution, does not appear opalescent within five minutes (limit of barium).

Action and Uses.—Calcium bromide has been recommended in epilepsy and chorea as a substitute for potassium bromide. Its rate of absorption is relatively slow. It is **administered** in solution, being too deliquescent for use in powders or cachets. The salt is incompatible with alkali carbonates, phosphates and sulphates.

Dose.– 0·5 to 2 grammes (8 to 30 grains).

CALCII CARBONAS

(Calc. Carb.)

Calcium Carbonate

$CaCO_3 = 100·1$

Synonyms—Calcii Carbonas Præcipitatus; Precipitated Calcium Carbonate; Precipitated Chalk.

Calcium carbonate may be obtained by double decomposition between sodium carbonate and a soluble calcium salt. It occurs as a white, odourless and tasteless, microcrystalline powder. Grades of different densities are obtainable in commerce; the lightest grades are not microcrystalline.

Almost **insoluble** in water; slightly soluble in water containing carbon dioxide.

Standard, B.P.—Calcium carbonate contains not less than 98·5 per cent. of $CaCO_3$, calculated on the substance dried at 100°. Loss on drying at 100°, not more than 1 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for aluminium, iron and matter insoluble in hydrochloric acid, soluble alkali, chloride, sulphate and iron.

Action and Uses.—Calcium carbonate is used **internally** in the same way as chalk, although the latter is sometimes preferred on account of its amorphous condition. It is used chiefly as a basis for tooth powders, its microcrystalline character conferring advantages over chalk for this purpose. A siliceous basis is, however, more suitable for tooth powders containing boric acid or phenol. Applied **externally**, calcium carbonate is antacid and protective, forming, when made into a cream with oil, a soothing application for burns. It is **administered** in cachets or powders and in the form of Pulvis Bismuthi Compositus, Trochisci Alkalini Compositi, or Trochisci Antacidi.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

Preparations

Creta cum Camphora, B.P.C.—(Cret. c. Camph.)—Camphorated Chalk. Camphor, 1 in 10, with calcium carbonate.

Pulvis Bismuthi Compositus, B.P.C.—(Pulv. Bism. Co.)—Compound Bismuth Powder. Bismuth carbonate, 1 part; calcium carbonate, 3 parts; heavy magnesium carbonate, 3 parts; sodium bicarbonate, 1 part. Dose.– 1 to 4 grammes (¼ to 1 drachm).

Trochisci Alkalini Compositi, B.P.C.—(Troch. Alk. Co)—Compound Alkaline Lozenges Each lozenge contains 12 grains of compound bismuth powder.

Trochisci Antacidi, B.P.C.—(Troch Antacid.)—Antacid Lozenges. Each lozenge contains 3½ grains of calcium carbonate, 2½ grains of heavy magnesium carbonate and 1 grain of sodium chloride

CALCII CHLORIDUM

(Calc. Chlorid.)

Calcium Chloride

$CaCl_2 = 111{\cdot}0$

Calcium chloride may be prepared by the interaction of hydrochloric acid and calcium carbonate, the product being evaporated and dried at a temperature not exceeding 200°. It occurs in white granules or porous masses which are very deliquescent and have a warm, slightly bitter taste. Other varieties occurring in commerce are the two hydrated crystalline forms, $CaCl_2,6H_2O$ and $CaCl_2,2H_2O$, and "fused" calcium chloride which contains varying proportions of water. A crude form of calcium chloride is used in ice machines for the production of a solution of low freezing-point. Calcium chloride should be **stored** in well-closed containers.

Soluble in water (1 in 1·5) and alcohol (90 per cent.) (1 in 3).

Standard, B.P.—Calcium chloride contains not less than 98 per cent. of $CaCl_2$, calculated on the substance dried at 200°. Loss on drying at 200°, not more than 10 per cent. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for free alkali, sulphate, and for aluminium, iron, phosphate and matter insoluble in hydrochloric acid.

Action and Uses.—Calcium is present in every normal body cell and is necessary for its proper functioning. On the breakdown of the mechanism that regulates the proper utilisation of the supply of calcium in the food and of the large available store in the bones, symptoms of calcium deficiency become apparent. In this condition, treatment with parathyroid extract, vitamin D, or ultra-violet light is often of greater value than the administration of calcium salts by the mouth. In conditions where calcium is necessary in abnormal quantity, such as in pregnancy and lactation, calcium should be administered in conjunction with a high vitamin intake. In exophthalmic goitre there is a considerable loss of calcium from the bones, and calcium salts should be administered. Calcium salts are also indicated in tetany; severe cases require parathyroid in addition. Laryngeal or bronchial spasm and convulsions may be treated by the intravenous injection of 20 millilitres (300 minims) of a 5 per cent w/v solution of calcium chloride. The intramuscular injection of 0·06 gramme (1 grain) of calcium chloride has been recommended for the treatment of laryngismus in children.

In the tetany of rickets or osteomalacia the use of parathyroid is contra-indicated, except in an emergency, since calcium is removed from the bones to increase the blood-calcium. The intravenous injection of calcium chloride has been advocated in the treatment of pulmonary tuberculosis. In the prevention of lead poisoning a high calcium diet is necessary. The toxic episodes of lead poisoning, namely, colic, palsy and meningo-encephalopathy, are urgent indications for calcium therapy, since calcium favours lead storage. On the other hand, the elimination of lead is accelerated by a low calcium diet, together with the administration of ammonium chloride. Caution is necessary, however, since lead is rapidly mobilised by this method; it should only be employed during a quiescent stage or severe manifestations of plumbism will occur. In severe cases of colic 15 millilitres (225 minims) of a 5 per cent. w/v solution of calcium chloride should be given intravenously. The effect on the pain is probably superior to that of any other therapeutic measure. The injection may be repeated after two hours. Renal colic and gallstone colic are amenable to the same treatment.

Administration of calcium is recommended in acute necrosis of the liver, such as in eclampsia, chloroform poisoning and poisoning from cinchophen, and in jaundice generally. A daily dose of 5 millilitres (75 minims) of a 10 per cent. w/v solution of calcium chloride is reported to have had good results in acne vulgaris. In asthma, urticaria, angioneurotic œdema, serum disease and other allergic states, calcium is of value since it decreases the permeability of the capillary endothelium. It has long enjoyed a vogue in the treatment of chilblains. In chronic ulcerative conditions such as varicose ulcers, and also in gastric ulcer and in fractures, calcium appears to expedite the healing process. On account of its power to increase the coagulability of the blood, calcium chloride is used in hæmoptysis and purpuric eruptions to arrest hæmorrhage. Its use has also been advocated in post-influenzal debility as it increases the force of the heart. Since calcium chloride when given by mouth is somewhat irritating to the gastro-intestinal tract, calcium lactate is often prescribed instead. Calcium should be administered prior to operations in cases of jaundice and tonsillitis.

Calcium chloride is best **administered** in dilute solution flavoured with tincture of orange or simple elixir. Care is necessary when injecting strong solutions, and the injection should be made slowly. Solutions of calcium chloride for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. Occasionally calcium chloride is applied externally in dilute solutions to bleeding points, as a styptic. It is also added to Nauheim baths to increase their specific gravity; it is not absorbed through the skin. It is **incompatible** with soluble carbonates, phosphates, tartrates and sulphates.

Dose.–0·6 to 2 grammes (10 to 30 grains), by the mouth; 0·03 to 0·1 gramme ($\frac{1}{2}$ to $1\frac{1}{2}$ grains), by intramuscular injection; 0·3 to 1 gramme (5 to 15 grains), by intravenous injection.

Preparation

Syrupus Calcii Chloridi, B.P.C.—(Syr. Calc. Chlorid.)—Syrup of Calcium Chloride. *Syn.*—Elixir Calcii Chloridi; Elixir of Calcium Chloride. Calcium chloride, 1 in 8, with distilled water and syrup of lemon. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

CALCII ET SODII LACTAS

(Calc. et Sod. Lact.)

Calcium Sodium Lactate

$C_{12}H_{20}O_{12}CaNa_2,4H_2O = 514{\cdot}3$

Calcium sodium lactate, $Ca(C_3H_5O_3)_2,2NaC_3H_5O_3,4H_2O$, may be prepared by dissolving two equal parts of calcium lactate separately in water, precipitating one portion with the required amount of sodium carbonate, filtering off the calcium carbonate and then mixing the two clear solutions, when the double salt is obtained by evaporation. It occurs as a white powder or as colourless, hard granules, which melt when heated above 100°, and lose water of crystallisation on further heating. It is deliquescent when exposed to air. When aqueous solutions are warmed with potassium permanganate an odour of acetaldehyde is produced. It should be **stored** in well-closed containers.

Soluble in water (about 1 in 15) and boiling alcohol (about 1 in 10); insoluble in ether and benzene.

Standard.—Calcium sodium lactate contains not less than 8·5 per cent. and not more than 9·5 per cent. of Ca, and not less than 10 per cent. and not more than 11 per cent. of Na, both calculated on the substance dried at 130°. Loss on drying at 130°, not more than 16 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. 0·5 gramme with 1·5 millilitres of nitric acid complies with the limit test for chlorides. 0·5 gramme with 5 millilitres of hydrochloric acid complies with the limit test for sulphates. A solution of 5 grammes in hot water does not become pink on the addition of a few drops of phenolphthalein solution, and requires not more than 0·5 millilitre of N/1 sodium hydroxide to produce a pink colour (limit of acidity).

Assay.—For calcium. Weigh accurately about 1 gramme, dissolve in about 50 millilitres of water, add 5 millilitres of acetic acid and excess of ammonium oxalate solution and boil for thirty minutes, collect the precipitate, wash, dry, ignite, and titrate the residue with N/10 sulphuric acid, using methyl orange as indicator; each millilitre of N/10 sulphuric acid is equivalent to 0·002004 gramme of Ca.

For sodium. Weigh accurately about 1 gramme, ignite gently, and titrate the residue with N/10 sulphuric acid, using methyl orange as indicator; deduct the number of millilitres of N/10 sulphuric acid required in the assay for calcium; each millilitre of N/10 sulphuric acid is equivalent to 0·00230 gramme of Na.

Action and Uses.—Calcium sodium lactate has the same action as

calcium lactate, but is more soluble and easy of absorption. Its use is stated to be beneficial in the night-sweats of phthisis, hæmoptysis, difficult dentition and in certain types of dermatitis. It is usually **administered** in tablets.

Dose.– 0·3 to 2 grammes (5 to 30 grains).

Preparation

Tabellæ Parathyroidei et Calcii et Sodii Lactatis, B.P.C.—(Tab. Parathyroid. et Calc. et Sod. Lact.)—Tablets of Parathyroid and Calcium Sodium Lactate. Each tablet contains $7\frac{1}{2}$ grains of calcium sodium lactate and $\frac{1}{10}$ grain of parathyroid. Dose.– 1 to 4 tablets.

CALCII FORMAS

(Calc. Form.)

Calcium Formate

$C_2H_2O_4Ca = 130{\cdot}1$

Calcium formate, $(HCOO)_2Ca$, may be prepared by neutralising formic acid with calcium carbonate, and evaporating the solution, from which the calcium formate separates as a glistening crystalline crust, or in large crystals. It occurs in the form of anhydrous, rhombic crystals. In hot solution it reduces salts of silver and mercury. When treated with sulphuric acid, carbon monoxide is evolved, and when heated with calcium benzoate, benzaldehyde is formed together with calcium carbonate.

Soluble in water (1 in 8); insoluble in alcohol.

Standard.—Calcium formate contains not less than 98 per cent. of $C_2H_2O_4Ca$. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million.

Assay.—Dissolve about 0·8 gramme, accurately weighed, in 100 millilitres of water and to 10 millilitres of the solution add 3 millilitres of sodium carbonate solution; add 50 millilitres of N/10 potassium permanganate and allow to stand at 50° for fifteen minutes; add 50 millilitres of N/10 oxalic acid and 5 millilitres of sulphuric acid, heat to 60° and titrate with N/10 potassium permanganate. Carry out a control test, omitting the calcium formate, and subtract the result from the number of millilitres used in the final titration; each millilitre of N/10 potassium permanganate is equivalent to 0·003252 gramme of $C_2H_2O_4Ca$.

Action and Uses.—Calcium formate is employed for the supposed tonic action of the formic radicle upon striped and unstriped muscle when calcium salts are indicated. It is usually **administered** in cachets. Solutions of calcium formate for **injection** may be sterilised by filtration. It is **incompatible** with the alkali carbonates, phosphates, and sulphates.

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

CALCII GLYCEROPHOSPHAS

(Calc. Glycerophosph.)

Calcium Glycerophosphate

$C_3H_7O_6PCa,2H_2O = 246{\cdot}2$

Synonym—Calcium Glycerylphosphate.

Calcium glycerophosphate, $CaC_3H_5(OH)_2PO_4,2H_2O$, may be prepared by adding glycerophosphoric acid to an excess of milk of lime, filtering when cold and washing with water. The filtrate, with added washings, is deprived of excess of lime by means of carbon dioxide, and concentrated to a low bulk, when the separated salt may be collected, or it may be completely precipitated by alcohol. Calcium glycerophosphate occurs as a white or creamy-white powder, consisting largely of hydrated calcium α-glycerophosphate. It may be rendered anhydrous by heating at 130°. It should be **stored** in well-stoppered bottles. Preparations containing a large proportion of the somewhat insoluble β-salt are sometimes sophisticated by the addition of citric acid, in order to render them soluble. Acid calcium glycerophosphate should not be used, since it becomes hydrolysed in aqueous solution and deposits calcium phosphate.

Soluble in cold water; almost insoluble in boiling water; insoluble in alcohol.

Standard.—Calcium glycerophosphate contains not less than 98 per cent. of $C_3H_7O_6PCa$, calculated on the substance dried at 130°. Loss on drying at 130°, not more than 15 per cent. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. 1 gramme dissolves in 50 millilitres of cold water with only a slight turbidity. Dissolve 0·5 gramme in 10 millilitres of water acidified with sulphuric acid, add 2 millilitres of mercuric sulphate solution, boil and, if necessary, filter while hot; the hot filtrate on the addition of potassium permanganate solution, drop by drop, does not produce a white precipitate (limit of citrate). When shaken with 25 parts of dehydrated alcohol and filtered, it yields, on evaporation of the alcohol and subsequent drying at 70° for one hour, not more than 1 per cent. of residue (limit of glycerin, etc.). A weight equivalent to 1 gramme of the salt dried at 130°, dissolved in 100 millilitres of water, requires for neutralisation to phenolphthalein not more than 2 millilitres of N/10 hydrochloric acid or N/10 sodium hydroxide (limit of alkalinity or acidity); the resulting solution requires not less than 9 millilitres of N/2 hydrochloric acid for neutralisation to methyl orange (minimum limit for glycerophosphate).

Assay.—Ignite about 0·5 gramme, accurately weighed, and weigh the residue; 1 gramme of the residue is equivalent to 1·653 grammes of $C_3H_7O_6PCa$.

Action and Uses.—Calcium glycerophosphate is used in the treatment of neurasthenia. It is a constituent of the compound syrups and glycerins of the glycerophosphates (see Acidum Glycerophosphoricum).

It may also be dispensed alone or in combination with iron glycerophosphate in cachets and may be given hypodermically in doses of 0·1 gramme (1½ grains). It is **incompatible** with carbonates, phosphates and sulphates.

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

CALCII HYDROXIDUM

(Calc. Hydrox.)

Calcium Hydroxide

$Ca(OH)_2 = 74·1$

Synonym.—Calcii Hydras.

Calcium hydroxide, or slaked lime, is prepared by the action of water on calcium oxide. It occurs as a soft, white powder with an alkaline, slightly bitter taste. The aqueous solution has an alkaline reaction and readily absorbs carbon dioxide from the air. Calcium hydroxide dissolves in solutions of sugars with formation of calcium saccharosates. It should be **stored** in well-closed containers.

Slightly **soluble** in water (1 in 900); less soluble in hot water; more readily soluble in solutions of glycerin.

Standard, B.P.—Calcium hydroxide contains not less than 90 per cent. of $Ca(OH)_2$. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for aluminium, iron and matter insoluble in hydrochloric acid, chloride and sulphate.

Action and Uses.—Calcium hydroxide is antacid and astringent, and is usually administered in solution. It is used internally in the form of Liquor Calcii Hydroxidi as a mild antacid in the treatment of the diarrhœa and vomiting of infants. Liquor Calcii Hydroxidi is also frequently added to milk to prevent the formation of large clots of curd in the stomach and is employed **externally** as a skin lotion with calamine or zinc oxide. Linimentum Calcii Hydroxidi cum Oleo Lini is a popular remedy for application to burns and scalds. Various compound oily liniments are also used, in which a soap formed from solution of calcium hydroxide serves as the emulsifying agent.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Linimentum Calcii Hydroxidi, B.P.C.—(Lin. Calc. Hydrox.)—Liniment of Calcium Hydroxide. *Syn.*—Linimentum Calcis; Liniment of Lime. Solution of calcium hydroxide and olive oil, equal parts.

This liniment was included in the British Pharmacopœia, 1914, under the name of Linimentum Calcis.

Linimentum Calcii Hydroxidi cum Oleo Lini, B.P.C.—(Lin. Calc. Hydrox. c. Ol. Lini.)—Liniment of Calcium Hydroxide with Linseed Oil. *Syn.*—Lime Water and Oil; Carron Oil; Linimentum Calcis cum Oleo Lini. Solution of calcium hydroxide and linseed oil, equal parts.

Liquor Calcii Hydroxidi, B.P.—(Liq. Calc. Hydrox.)—Solution of Calcium Hydroxide. *Syn.*—Liquor Calcis; Solution of Lime; Lime Water. A saturated aqueous solution of calcium hydroxide. At 15·5° it contains not less than 0·15 per cent. w/v of $Ca(OH)_2$. Arsenic limit, 0·2 part per million. Lead limit, 0·5 part per million. It complies also with a limit test for chlorides. It should be stored in completely-filled, well-closed containers. Dose.– 30 to 120 millilitres (1 to 4 fluid ounces).

Liquor Calcii Hydroxidi Saccharatus, B.P.C.—(Liq. Calc. Hydrox. Sacch.)—Saccharated Solution of Calcium Hydroxide. *Syn.*—Liquor Calcis Saccharatus; Saccharated Solution of Lime. It contains the equivalent of not less than 2·4 per cent. w/v of $Ca(OH)_2$ with sucrose and distilled water. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

This solution was included in the British Pharmacopœia, 1914, under the name of Liquor Calcis Saccharatus.

CALCII HYPOPHOSPHIS

(Calc. Hypophosph.)

Calcium Hypophosphite

$CaP_2H_4O_4 = 170·2$

Calcium hypophosphite, $Ca(H_2PO_2)_2$, may be obtained by heating phosphorus with milk of lime. When interaction is complete the solution is filtered and evaporated to dryness, or the salt is allowed to crystallise after concentration. It occurs as an odourless, white powder, or in lustrous crystals, having a nauseous and bitter taste. On heating, the salt decrepitates, and at 300° spontaneously inflammable gases are evolved. A solution acidified with hydrochloric acid gradually added to mercuric chloride solution produces a white precipitate which becomes grey when excess of the acid solution is added. It is a powerful reducing agent, its admixture with certain oxidising bodies, such as nitrates and chlorates, being attended with some danger. It should be **stored** in well-stoppered bottles.

Soluble in water (1 in 8); in boiling water slightly more so; insoluble in alcohol.

Standard.—Calcium hypophosphite contains not less than 98 per cent. of $CaP_2H_4O_4$. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. 1 gramme dissolved in 20 millilitres of water requires for neutralisation not more than 0·5 millilitre of N/10 sodium hydroxide, using phenolphthalein as indicator. Not more than 0·5 per cent. is insoluble in water (limit of phosphate). 1 gramme dissolved in 20 millilitres of water and filtered remains clear on the addition of an equal volume of calcium sulphate solution (limit of barium).

Assay.—Dissolve about 1·0 gramme, accurately weighed, in 100 millilitres of water. To 10 millilitres of the solution in a stoppered flask add 10 millilitres of 25 per cent. w/v sulphuric acid and 30 millilitres of N/10 iodine. Allow to stand in the dark for twelve hours and titrate the excess of iodine with N/10 sodium thiosulphate; each millilitre of N/10 iodine is equivalent to 0·004254 gramme of $CaP_2H_4O_4$.

Action and Uses.—Calcium hypophosphite is given in general debility, but the hypophosphite ion has no known specific action. It is commonly prescribed as Syrupus Hypophosphitum Compositus, or, if the presence of sugar is undesirable, as Glycerinum Hypophosphitum Compositum (see Acidum Hypophosphorosum Dilutum). It is also given in association with malt extract, with or without cod-liver oil, or with emulsion of cod-liver oil or liquid paraffin. Calcium hypophosphite, in common with other hypophosphites, is a powerful reducing agent and does not keep well in aqueous solution. Its oxidation, in solution, may be retarded by the addition of a little free hypophosphorous acid. It is **incompatible** with oxidising agents, and with iron and ammonium citrate.

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

MAGNESII HYPOPHOSPHIS.—Magnesium hypophosphite, $Mg(H_2PO_2)_2$, $6H_2O$, may be prepared by boiling magnesium oxalate with a solution of calcium hypophosphite, filtering the solution and allowing the salt to crystallise. It occurs in white crystals, soluble in water (1 in 5). Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

Preparation

Syrupus Calcii Hypophosphitis, B.P.C.—(Syr. Calc. Hypophosph.)—Syrup of Calcium Hypophosphite. Each fluid drachm contains 1 grain of calcium hypophosphite, with hypophosphorous acid, sucrose and distilled water. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

CALCII IODIDUM

(Calc. Iod.)

Calcium Iodide

$CaI_2 = 293·9$

Calcium iodide may be prepared by the action of calcium hydroxide on ferrous iodide, or by neutralising hydriodic acid with calcium hydroxide or carbonate, filtering, evaporating to dryness, and fusing. It occurs as a white, deliquescent mass or powder, which becomes yellow on keeping. It has a bitter taste. Calcium iodide should be **stored** in well-closed containers.

Very **soluble** in water and alcohol.

Standard.—Calcium iodide, determined by the method of the British Pharmacopœia for Potassii Iodidum, contains not less than 80 per cent. of CaI_2; each millilitre of M/20 potassium iodate is equivalent to 0·0147 gramme of CaI_2. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million.

Action and Uses.—Calcium iodide has the general properties of iodides and calcium salts.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

CALCII LACTAS

(Calc. Lact.)

Calcium Lactate

$C_6H_{10}O_6Ca,5H_2O = 308{\cdot}2$

Calcium lactate, $(CH_3{\cdot}CHOH{\cdot}COO)_2Ca,5H_2O$, may be obtained by neutralising warm, diluted lactic acid with calcium carbonate, filtering while hot and crystallising. Large quantities are obtained as an intermediate product in the preparation of lactic acid. It occurs as a white powder with a slight but not unpleasant odour and a slight taste. It effloresces on exposure to air and becomes anhydrous when heated at 100°. Calcium lactate should be **stored** in well-closed containers.

Very slowly but completely **soluble** in water (1 in 18·5); readily soluble in hot water; slightly soluble in alcohol (90 per cent.); insoluble in ether.

Standard, B.P.—Calcium lactate contains not less than 97 per cent. and not more than the equivalent of 103 per cent. of $C_6H_{10}O_6Ca$, $5H_2O$. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for alkalinity or acidity, various sugars, sulphate, chloride and iron.

Action and Uses.—Calcium lactate has the characteristic action of calcium (see Calcii Chloridum). It increases the coagulability of the blood, and is given before operations with this object, in doses of 1 to 2 grammes (15 to 30 grains). It is also used for chilblains and chronic ulcerations, in hæmophilia and some forms of albuminuria, and in rickets and tuberculous disease. It is much less irritating than calcium chloride, and may be injected subcutaneously. Calcium lactate, like other calcium salts, has probably little or no specific action when given orally, except in conjunction with the administration of vitamin D.

Calcium lactate is frequently **administered** in solution prepared directly from calcium carbonate and lactic acid (Liquor Calcii Lactatis). A solution containing about 100 grains of freshly prepared calcium lactate may be obtained by adding gradually 40 grains of calcium carbonate to 60 minims of lactic acid diluted with about ten times its volume of water and boiling the mixture for twenty minutes; the excess of calcium carbonate is then removed by filtration, the precipitate washed, and the mixed filtrate and washings diluted to the required volume. For chilblains, large doses should be given periodically for two or three days in preference to continuous administration.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

CALCII GLUCONAS.—Calcium gluconate is a white, crystalline powder, readily soluble in water. It is administered in all forms of calcium deficiency, either by the mouth in doses of 5 grammes (75 grains) three times a day, or intravenously in solution. The dose by injection is 1 gramme (15 grains) every day, on alternate days, or every third day.

CALCII LACTOPHOSPHAS.—Calcium lactophosphate may be prepared by mixing calcium carbonate, lactic acid, phosphoric acid and distilled water and

evaporating to dryness. It occurs as a white, hygroscopic, crystalline powder, soluble in water. Calcium lactophosphate is a stomachic tonic, especially useful for children. It is best administered in the form of Syrupus Calcii Lactophosphatis, which is pleasantly acid to the taste, or it may be combined with ferrous lactate as Syrupus Calcii Lactophosphatis cum Ferro. Dose.– 0·2 to 0·5 gramme (3 to 8 grains).

MAGNESII LACTAS.—Magnesium lactate, $C_6H_{10}O_6Mg$, $3H_2O$, occurs as a white, crystalline powder, which when heated decomposes without melting. It is soluble in water (1 in 30), boiling water (1 in 6), and insoluble in alcohol. Magnesium lactate may be used as a mild laxative. Dose.– 1 to 4 grammes (¼ to 1 drachm).

MAGNESII LACTOPHOSPHAS.—Magnesium lactophosphate is a mixture of magnesium phosphate and magnesium lactate. It occurs as a white powder, soluble in water. Dose.– 0·2 to 1 gramme (3 to 15 grains).

POTASSII LACTAS.—Potassium lactate, $C_3H_5O_3K$, occurs as a colourless or yellowish, syrupy liquid or as an amorphous mass. It is very hygroscopic, and soluble in water or alcohol, but insoluble in ether. Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Liquor Calcii Lactatis, B.P.C.—(Liq. Calc. Lact.)—Solution of Calcium Lactate. 15 millilitres contains about 0·7 gramme, and 4 fluid drachms contains about 10 grains, of calcium lactate dissolved in chloroform water. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Syrupus Calcii Lactophosphatis, B.P.C.—(Syr. Calc. Lactophosph.)—Syrup of Calcium Lactophosphate. Each fluid drachm contains calcium lactophosphate equivalent to about 4 grains of calcium lactate, with phosphoric acid, triple orange-flower water, sucrose and distilled water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This syrup was included in the British Pharmacopœia, 1914.

Syrupus Calcii Lactophosphatis cum Ferro, B.P.C.—(Syr. Calc. Lactophosph. c. Ferr.)—Syrup of Calcium Lactophosphate with Iron. Each fluid drachm contains about ½ grain of ferrous lactate with potassium citrate and distilled water in syrup of calcium lactophosphate. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tabellæ Parathyroidei et Calcii Lactatis, B.P.C.—(Tab. Parathyroid. et Calc. Lact.)—Tablets of Parathyroid and Calcium Lactate. Each tablet contains 5 grains of calcium lactate and $\frac{1}{10}$ grain of parathyroid. Dose.– 1 to 4 tablets.

CALCII OXIDUM

(Calc. Oxid.)

Calcium Oxide

$CaO = 56·08$

Synonyms—Calx; Lime; Quicklime.

Calcium oxide may be obtained by calcining marble. It occurs as white or greyish-white masses which readily absorb water and carbon dioxide if exposed to the air. It is odourless, and has an alkaline reaction and a caustic, burning taste. When about half its weight of water is added, the mass swells, with the evolution of much heat, and falls to powder, producing calcium hydroxide, commonly known as slaked lime, the process being known as slaking. Water agitated with calcium oxide becomes alkaline to phenolphthalein. Milk of lime is

prepared by mixing 1 part of calcium oxide with 2 parts of water. Calcium oxide slaked with solution of sodium hydroxide, dried, and ignited to redness forms soda-lime. Calcium oxide should be **stored** in air-tight containers, in a dry place.

Standard.—Calcium oxide, determined by the method of the British Pharmacopœia for Calcii Hydroxidum, contains not less than 95 per cent. of CaO, calculated on the ignited substance; each millilitre of N/1 hydrochloric acid is equivalent to 0·02804 gramme of CaO. Loss on ignition, not more than 10 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. 1 gramme with 4 millilitres of nitric acid complies with the limit test for chlorides. 0·5 gramme with 2·5 millilitres of hydrochloric acid complies with the limit test for sulphates. Shake 2 grammes with 20 millilitres of water, add 10 millilitres of hydrochloric acid, boil, make alkaline with ammonia, filter and wash; the insoluble residue after ignition weighs not more than 0·02 gramme (limit of aluminium, iron and insoluble matter).

Action and Uses.—Calcium oxide is used in the preparation of caustic pastes such as Pasta Londinensis, which is a mixture of quicklime with sodium hydroxide made into a paste with water at the time of using. Calcium oxide burns of the eyes may be treated by irrigation with a solution of neutral ammonium tartrate; ointment of trinitrophenol (1 in 50) has also been recommended.

CALCII PERMANGANAS

(Calc. Permang.)

Calcium Permanganate

$CaMn_2O_8,5H_2O = 368·0$

Calcium permanganate, $Ca(MnO_4)_2,5H_2O$, may be prepared by decomposing a solution of silver permanganate with calcium chloride, filtering off the precipitated silver chloride, evaporating the solution and allowing it to crystallise; or by first preparing a dilute solution of permanganic acid, and then neutralising it with calcium carbonate, concentrating the liquid and allowing to crystallise. It occurs as deliquescent, crimson crystals, or purplish-red, crystalline masses.

Very **soluble** in water.

Standard.—Calcium permanganate, determined by the method of the British Pharmacopœia for Potassii Permanganas, contains not less than 95 per cent. of $CaMn_2O_8,5H_2O$; each millilitre of N/10 oxalic acid is equivalent to 0·00368 gramme of $CaMn_2O_8,5H_2O$. Dissolve 1 gramme in 10 millilitres of hot water, decolourise by the addition of 4 grammes of oxalic acid, and add sufficient hydrochloric acid to produce

a clear solution; no colouration is produced on passing hydrogen sulphide into the solution (limit of heavy metals).

Action and Uses.—Calcium permanganate has the same action as the potassium salt, but is stated to be a more powerful antiseptic and to have a less disagreeable taste. It has been used internally in gastritis and gastric ulcer, also as a local application for rodent ulcer, inoperable offensive carcinoma and similar conditions. Doses of 0·016 gramme (¼ grain) have been used for the treatment of thread-worm infection in children. Calcium permanganate is **administered** in capsules containing liquid paraffin or in pills massed with kaolin ointment.

Dose.– 0·03 to 0·1 gramme (½ to 1½ grains).

CALCII PEROXIDUM

(Calc. Perox.)

Calcium Peroxide

$CaO_2 = 72·08$

Calcium peroxide may be prepared by adding calcium hydroxide solution to a solution of hydrogen peroxide; the hydrated peroxide thus formed, $CaO_2,8H_2O$, becomes anhydrous on heating to about 130°. It occurs as a whitish powder. At a red heat it is rapidly decomposed into calcium oxide and oxygen, and is slowly decomposed, with evolution of oxygen, in the presence of water. In contact with glycerin or formaldehyde solution it is liable to form explosive mixtures. 0·01 gramme in 10 millilitres of water with 1 drop of dilute sulphuric acid, on the addition of a few millilitres of ether and a drop of potassium dichromate solution, produces a blue colour which passes into the ethereal layer after shaking.

Very slightly **soluble** in water.

Standard.—Calcium peroxide contains not less than 30 per cent. of CaO_2.

Assay.—Shake about 0·2 gramme, accurately weighed, with 25 millilitres of water and 25 millilitres of dilute hydrochloric acid and titrate with N/10 potassium permanganate; each millilitre of N/10 potassium permanganate is equivalent to 0·003604 gramme of CaO_2.

Action and Uses.—Calcium peroxide possesses antacid and antiseptic properties, and has been used as an intestinal disinfectant; it has also been employed in the treatment of digestive disturbances in children, especially in acid dyspepsia, being administered in milk. It is also used in dentifrices.

Dose.– 0·2 to 0·5 gramme (3 to 8 grains).

CALCII PHOSPHAS
(Calc. Phosph.)

Calcium Phosphate

Calcium phosphate may be obtained by purifying bone ash or by the interaction of boiling solutions of calcium chloride and sodium phosphate in the presence of excess of ammonia. It consists chiefly of a mixture of dibasic calcium phosphate, $CaHPO_4$, and tribasic calcium phosphate, $Ca_3(PO_4)_2$, together with some monobasic acid calcium phosphate, $Ca(H_2PO_4)_2$, but the proportions in which these occur are very variable. Calcium phosphate is sometimes supplied as tribasic calcium phosphate, but a pure tribasic or normal calcium phosphate is not obtainable. It occurs as a white, odourless, amorphous powder which is almost tasteless, and is stable in air.

Almost **insoluble** in water; soluble in dilute mineral acids.

Standard, B.P.—Calcium phosphate contains calcium equivalent to not less than 85 per cent. of $Ca_3(PO_4)_2$. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for carbonate and matter insoluble in hydrochloric acid, chloride, sulphate and iron.

Action and Uses.—Calcium phosphate forms three-fourths of the mineral matter in the body. It is contained mostly in the bones, to which it gives rigidity. Calcium phosphate is **administered** chiefly in the form of Syrupus Ferri Phosphatis Compositus for the treatment of general debility, rickets, etc. Syrup of calcium lactophosphate contains calcium phosphate in combination with lactic acid. Calcium phosphate is a useful antacid; it possesses the advantage over alkali hydroxides and carbonates of reducing the acidity in the stomach without producing systemic alkalisation. In the solid form, it may be given in powders, which may be taken in milk, or the powder may be dispensed in cachets. On account of its non-hygroscopic properties, it is sometimes used as a diluent of powders and extracts.

Dose.—0·6 to 2 grammes (10 to 30 grains).

CALCII SULPHAS EXSICCATUS
(Calc. Sulph. Exsic.)

Exsiccated Calcium Sulphate

$CaSO_4,\frac{1}{2}H_2O = 145{\cdot}1$

Synonyms—Plaster of Paris; Sulphate of Lime; Calcined Gypsum.

Exsiccated calcium sulphate is prepared by carefully roasting natural gypsum, $CaSO_4,2H_2O$. It occurs as a white, hygroscopic, odourless and tasteless powder. When mixed with a little water it forms a smooth paste which rapidly sets to a hard mass, but if completely dehydrated,

or heated above 200°, or if much hygroscopic moisture has been absorbed, it loses this property. The setting is retarded by adding a colloid or any substance which will decrease its solubility, and is accelerated by adding substances which increase its solubility. The following are said to be used: restrainers—alcohol, citric acid, althæa powder, dextrin, acacia, linseed mucilage, glue and sodium carbonate; accelerators—common salt and alum. It should be **stored** in a dry place in such a way as to protect it as far as possible from the action of moisture. Deterioration is indicated either by too rapid setting or by very slow setting, the set mass being more or less weakened and friable according to the degree of deterioration.

Slightly **soluble** in water; more soluble in dilute mineral acids; insoluble in alcohol.

Standard.—20 grammes of exsiccated calcium sulphate, mixed with 10 millilitres of water at 15° to 20° in a cylindrical mould about one inch in diameter, sets in about three minutes. The mass thus formed, after allowing to stand for three hours, possesses sufficient hardness to resist pressure of the fingers at the edges, which retain their sharpness of outline and do not crumble under pressure.

Uses.—The principal use of exsiccated calcium sulphate in pharmacy is for the preparation of plaster of Paris bandages. Extemporaneous bandages may be prepared by applying the exsiccated calcium sulphate thickly to a material such as check muslin or book muslin before rolling; after rolling, the whole is thoroughly moistened and wound round the limb. Alternatively, the exsiccated calcium sulphate may be mixed to a thin cream in a basin, and the unrolled bandaging material passed through the cream immediately before applying to the limb. The plaster will set and a splint form in from fifteen to twenty minutes; 1½ to 2 parts of water to 1 part of exsiccated calcium sulphate forms a suitable proportion, and a 5 per cent. solution of dextrin may be used in place of water. The bulk of the mass increases slightly as the plaster sets; interstices are thus filled and close application obtained.

Preparation

Ligamentum Calcii Sulphatis, B.P.C.—(Ligament. Calc. Sulph.)—Plaster of Paris Bandage. This bandage consists of bleached cotton cloth impregnated with exsiccated calcium sulphate and suitable adhesives.

CALENDULA

(Calend.)

Calendula

Synonyms—Marigold; Marigold Flowers.

Calendula consists of the dried, ligulate florets of *Calendula officinalis* Linn. (Fam. Compositæ), indigenous to the Levant and Southern

Europe, and now cultivated in England. When the flower-heads are fully expanded, the ray florets are collected and dried. It should be **stored** in a dry, cool place in closed containers.

The corollas are yellow or orange, about 12 to 35 millimetres long and 2·5 to 6 millimetres broad at the widest part, oblanceolate, terminating in three, sometimes two or four, acute teeth and having four veins. The tube of the corolla, about 1 millimetre long, is hairy, having two kinds of trichomes, the majority being long, bi-seriate and conical, while the remainder are shorter and end in a multicellular club-shaped head. The filiform style and bifid stigma are usually present and are accompanied by numerous, spherical, spiny pollen grains, about 30 to 35 microns in diameter, each showing 3 pores. The odour is slightly aromatic, and the taste bitter.

Calendula **contains** a tasteless, yellow substance, calendulin, a bitter principle and traces of an aromatic volatile oil. The drug yields to alcohol (90 per cent.) about 18 per cent. of extractive.

Standard.—Calendula contains not more than 2 per cent. of foreign organic matter.

Action and Uses.—Calendula was at one time believed to have the power of promoting the absorption of effused blood. It is a mild aromatic and possesses diaphoretic, diuretic and stimulant properties. It has been **administered** in the form of tincture in the treatment of amenorrhœa. The tincture, diluted with 10 to 20 parts of water, is used as a lotion, or with 10 parts of base as an ointment, for sprains and bruises.

Preparation

Tinctura Calendulæ, B.P.C.—(Tinct. Calend.)—Tincture of Calendula. 1 in 5.

CALOTROPIS

(Calot.)

Calotropis

Synonyms—Calotropis Bark; Mudar.

Calotropis is the dried root-bark of *Calotropis procera* Ait. and of *C. gigantea* Ait. (Fam. Asclepiadaceæ), trees indigenous to India and Ceylon, the former indigenous also to tropical Africa.

The bark occurs in short, curved or, more rarely, quilled pieces 2 to 5 millimetres thick and 2 to 3·5 centimetres broad, and sometimes rootlets are attached. The outer surface is soft, pale buff and longitudinally furrowed and the inner surface is pale yellow and granular; the fracture is short and mealy. Portions of the wood are sometimes attached. The drug is odourless and has a bitter and acrid taste.

The diagnostic **microscopical** characters are the wide, irregular, corky layer; a broad, parenchymatous pericycle and an abundant

secondary phloem consisting largely of parenchyma, with closely arranged, inconspicuous medullary rays, one cell wide; the pericycle and phloem rich in starch, the starch grains being either simple, measuring from 3 to 10 microns in length, with a distinct hilum and conspicuous striations, or compound, usually with two components; laticiferous vessels anastomosing throughout the pericycle and phloem, which contain numerous rosette-crystals of calcium oxalate; the absence of fibres.

Calotropis **contains** a yellow, bitter resin, a black, acid resin, a crystalline, colourless substance (madaralban), an amber-coloured, viscid substance (madarfluavil), and caoutchouc.

Action and Uses.—Calotropis resembles ipecacuanha in its action; small doses are diaphoretic and expectorant, and large doses cause vomiting and diarrhœa. Tincture of calotropis (Tinctura Calotropis, 1 in 10; dose, ½ to 1 fluid drachm) is used in India and the Eastern Colonies.

Dose.– Expectorant, 0·2 to 0·6 gramme (3 to 10 grains); emetic, 2 to 4 grammes (½ to 1 drachm).

CALUMBA
(Calumb.)
Calumba

Synonyms—Calumbæ Radix; Calumba Root.

Calumba consists of the dried, transverse or oblique slices of the root of *Jateorhiza palmata* (Lam.) Miers (Fam. Menispermaceæ), a climbing plant indigenous to Portuguese East Africa, and growing freely in forests near the Zambesi. The roots are dug up during the dry season, cut into slices and dried. The somewhat dull colour of the drug as imported is often brightened by a process of cleaning.

The slices of the root are irregularly circular or oval, depressed in the centre on both sides, usually about 2 to 6 centimetres in diameter and from 3 to 12 millimetres thick. They are of a more or less distinct yellow colour, the exterior being covered with a greyish-brown, longitudinally wrinkled cork. The transverse surface shows a dark cambium line separating the greenish-yellow outer region from the greyish inner region; the former is traversed by dark, sinuous strands of phloem and the latter shows concentric zones and radiating lines of yellowish xylem vessels. The fracture is short and starchy. The odour is slight, and the taste bitter.

The diagnostic **microscopical** characters are the isolated sclerenchymatous cells in the outer part of the bark, with yellow, unevenly thickened walls, and containing small prismatic crystals of calcium oxalate; the large reticulate vessels of the xylem, also yellow in colour and, like the sclerenchymatous cells, changing to green on treatment with 60

per cent. v/v sulphuric acid; the abundant starch grains mostly simple and about 20 to 85 microns in length, and having a well-marked, eccentric,. radiate or cleft hilum.

Calumba **contains** columbamine, palmatine and jateorhizine, three yellow, crystalline alkaloids, closely allied to berberine. It also contains two colourless, crystalline principles, columbin and chasmantherin, and an abundance of starch. Tannin is not a normal constituent of the drug. It yields to alcohol (60 per cent.) about 15 per cent. of extractive.

Substitutes and Adulterants.—The drug often contains portions of the rhizome from which the roots spring; these may be recognised by their smaller size, the diameter being about 2 centimetres, the narrow cortex and conspicuously radiate wood with strongly developed lignified tissue, in consequence of which the centre of the slices is prominent instead of being depressed. Slices of coscinium, occasionally imported as Ceylon calumba, and of the root of *Frasera caroliniensis* Walt. (Fam. Gentianaceæ), indigenous to North America, have been used as adulterants or substitutes for calumba. The latter are smaller and thicker, and contain tannin but no starch.

Standard, B.P.—Calumba contains not more than 2 per cent. of foreign organic matter. Ash, not more than 9 per cent.

Calumba, in powder (Pulvis Calumbæ : Pulv. Calumb.), contains the constituents and possesses the diagnostic microscopical characters of Calumba, and complies with the limit for ash of the unground drug.

Action and Uses.—Calumba is a simple bitter, and is given before meals for its reflex action in dyspepsia associated with hypochlorhydria. Its preparations possess the advantage of being compatible with salts of iron. It is usually **administered** in the form of infusion or tincture.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

COSCINIUM.—Coscinium consists of the dried stem of *Coscinium fenestratum* Colebr. (Fam. Menispermaceæ), common in India and Ceylon. It occurs in large, woody, cylindrical, straight pieces, sometimes as much as 10 centimetres in diameter. Externally, it is yellowish-brown in colour and longitudinally fluted or fissured, with smaller transverse fissures at intervals. Internally, it is yellow, the smoothed transverse surface exhibiting a large, yellow, conspicuously radiate xylem, porous wood-bundles alternating with dense medullary rays which are continued through the phloem, the latter tissue being lacunous from shrinkage away from the crenate ring of sclerenchyma immediately within the cortex. The fracture is short in the wood and fibrous in the bark. The drug has no odour, but a bitter taste. Coscinium contains the yellow, crystalline alkaloid, berberine; it also contains a saponin. Coscinium is a bitter used in India and the Eastern Colonies as an equivalent of calumba.

Preparations

Infusum Calumbæ Concentratum, B.P.—(Inf. Calumb. Conc.)—Concentrated Infusion of Calumba. Calumba, 1 in 2½, extracted with cold distilled water and preserved with alcohol. This concentrated infusion, when diluted with seven times its volume of distilled water, yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of calumba and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

A concentrated infusion, prepared with dilute chloroform water and alcohol (90 *per cent.*), *was included in the British Pharmaceutical Codex*, 1923.

Infusum Calumbæ Recens, B.P.—(Inf. Calumb. Rec.)—Fresh Infusion of Calumba. 1 in 20. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Tinctura Calumbæ, B.P.—(Tinct. Calumb.)—Tincture of Calumba. 1 in 10, prepared by maceration with alcohol (60 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

CALX CHLORINATA

(Calx. Chlorinat.)

Chlorinated Lime

Synonym—Bleaching Powder.

Chlorinated lime is prepared by exposing slaked lime to the action of chlorine gas until absorption ceases. It is sometimes known as "chloride of lime." It occurs as a dull white powder with a characteristic odour differing somewhat from that of chlorine. On exposure to the air it becomes moist and decomposes, carbon dioxide being absorbed and chlorine evolved. It is decomposed by acids, with evolution of the "available chlorine" upon which its value depends. The stability of bleaching powder in tropical temperatures is increased by admixture with unslaked lime. Chlorinated lime should be **stored** in well-closed containers.

Partly **soluble** in water and alcohol (90 per cent.).

Standard, B.P.—Chlorinated lime contains not less than 30 per cent. w/w of available chlorine.

Action and Uses.—Chlorinated lime, by virtue of its available chlorine, is a powerful disinfectant and deodorant. It is used to disinfect fæces, urine and, to some extent, rooms and houses. It has powerful bleaching properties and is capable of decolourising most dyestuffs. Chlorinated lime and liquid chlorine are used to purify water for drinking purposes; they should be added in such amount as to leave 0·25 to 0·5 part of free chlorine in a million parts of water. They communicate, however, a distinct taste to the water. After chlorination for twenty-four hours a small amount of sodium pyrosulphite may be added to combine with any excess of chlorine.

Wounds are frequently treated by continuous irrigation with chlorine-containing solutions, and in order to obtain satisfactory results a continuous supply of the solution must be available, since the chlorine or hypochlorite is rapidly exhausted by interaction with the proteins of the inflamed area. A solution of chlorine is of great value as a local application in acute tonsillitis, for which purpose it is best used from a vulcanite spray. Liquor Calcis Chlorinatæ is used as a wash for foul ulcers, as a nasal or vaginal injection, or as a gargle in tonsillitis, but its usefulness is limited on account of its irritant action. Liquor Calcis Chlorinatæ cum Acido Borico (eusol) is used as a general antiseptic, but on account of its alkaline reaction it is not suitable for use in the Carrel-Dakin method of continuous irrigation of infected wounds.

It has been used for intravenous injection in cases of septicæmia, and for this purpose it should be rendered isotonic by the addition of 0·85 per cent. of sodium chloride. On account of the rapid combination with the plasma proteins, its action is evanescent. It is employed as a vaginal douche, diluted 1 in 80.

Liquor Sodæ Chlorinatæ Chirurgicalis (Dakin's solution) is one of the most stable and suitable forms of chlorinated solution for the continuous irrigation of infected wounds. Liquor Sodæ Chlorinatæ cum Sodii Bicarbonate (Daufresne's solution) was devised for the Carrel-Dakin treatment, and is also an efficient form of chlorinated antiseptic for general purposes. Liquor Sodæ Chlorinatæ (bleaching solution) is used as a general disinfectant and oxidising agent. Externally, it is used, diluted with 10 to 15 parts of water, as a lotion for ulcers and foul wounds, and as a gargle or spray solution in tonsillitis, scarlet fever and diphtheria. It is sometimes employed as a bleaching agent. Labarraque's solution is a solution of chlorinated soda, about one-fourth the strength of Liquor Sodæ Chlorinatæ. Eau de Javelle is a similar solution of chlorinated potash. A mixture of equal parts of chlorinated lime and boric acid (eupad) may be used as an application to septic areas or employed for the extemporaneous preparation of solutions of eusol.

Preparations

Liquor Calcis Chlorinatæ, B.P.C.—(Liq. Calc. Chlorinat.). Solution of Chlorinated Lime. An aqueous solution containing the soluble matter from 10 per cent. w/v of chlorinated lime; it contains not less than 2 per cent. w/v of available chlorine.

This solution was included in the British Pharmacopœia, 1914.

Liquor Calcis Chlorinatæ cum Acido Borico, B.P.C.—(Liq. Calc. Chlorinat. c. Acid. Boric.)—Solution of Chlorinated Lime with Boric Acid. *Syn.*—Eusol. It contains, when freshly prepared, about 0·4 per cent. of available chlorine.

Liquor Chlori, B.P.C.—(Liq. Chlori)—Solution of Chlorine. *Syn.*—Aqua Chlori. An aqueous solution of chlorine gas containing about 0·5 per cent. w/v of chlorine.

Liquor Sodæ Chlorinatæ, B.P.C.—(Liq. Sod. Chlorinat.)—Solution of Chlorinated Soda. It contains from 2·5 to 3·0 per cent. w/v of available chlorine. Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

This solution was included in the British Pharmacopœia, 1914.

Liquor Sodæ Chlorinatæ Chirurgicalis, B.P.—(Liq. Sod. Chlorinat. Chir.)—Surgical Solution of Chlorinated Soda. *Syn.*—Dakin's Solution. It is prepared with chlorinated lime, sodium carbonate, boric acid and distilled water, and contains not less than 0·5 per cent. and not more than 0·55 per cent. w/v of available chlorine. It should be stored in well-closed containers, in a cool place, and protected from light. When stored it is liable to diminution in strength.

A similar solution was included in the British Pharmaceutical Codex, 1923, *under the name of Liquor Sodæ Chlorinatæ cum Acido Borico.*

Liquor Sodæ Chlorinatæ cum Sodii Bicarbonate, B.P.C.—(Liq. Sod. Chlorinat. c. Sod. Bicarb.)—Solution of Chlorinated Soda with Sodium Bicarbonate. *Syn.*—Daufresne's Solution. It contains from 0·42 to 0·48 per cent. w/v of available chlorine.

CALX SULPHURATA

(Calx Sulphur.)

Sulphurated Lime

Synonym—Calcium Sulphide.

Sulphurated lime is a mixture containing calcium sulphide (CaS = 72·14) and calcium sulphate, prepared by mixing calcium sulphate, 70 parts, and charcoal, 10 parts, packing the mixture lightly into a crucible, covering loosely, and heating to bright redness until the contents have lost their black colour. The product, after cooling, is powdered and at once transferred to well-closed containers. It occurs as a greyish-white, amorphous powder, with an odour of hydrogen sulphide, a disagreeable, alkaline taste and an alkaline reaction. It should be **stored** in well-closed containers.

Sparingly **soluble** in water; more soluble in boiling water, with decomposition; readily dissolved by solutions of ammonium salts; insoluble in alcohol.

Standard.—Sulphurated lime contains not less than 50 per cent. of CaS.

Assay.—Mix about 1 gramme, accurately weighed, with 10 millilitres of water in a 100 millilitre graduated flask, add 25 millilitres of copper sulphate solution and 10 millilitres of dilute hydrochloric acid, and warm on a water-bath for fifteen minutes, shaking frequently. Cool, make up to volume and filter, rejecting the first 25 millilitres of the filtrate; to 25 millilitres of the filtrate add 1 gramme of potassium iodide and titrate with N/10 sodium thiosulphate, using starch mucilage as indicator. Repeat the experiment, omitting the sulphurated lime, and calculate the result from the difference between the two titrations; each millilitre of N/10 sodium thiosulphate is equivalent to 0·007214 gramme of CaS.

Action and Uses.—Sulphurated lime is used to arrest and prevent suppuration, especially in the treatment of boils, carbuncles and pustular acne. It is **administered** in tablets, capsules and pills, which should be well varnished (not silvered) and kept in a bottle. A solution of calcium polysulphides (Liquor Calcis Sulphuratæ, Vleminckx's solution) is used for application to the skin, either as a pigment or diluted (1 ounce to 5 gallons of water) for the bath, in the treatment of scabies and similar conditions. The name "lime-sulphur" is applied to a solution of calcium polysulphides which is used as a fungicide in horticulture. A dilution of 1 in 30 is used as a spray for fruit trees during the summer, and in winter a 1 in 60 dilution is similarly employed.

Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

Preparation

Liquor Calcis Sulphuratæ, B.P.C.—(Liq. Calc. Sulphurat.)—Solution of Sulphurated Lime. *Syn.*—Lotio Calcis Sulphuratæ; Vleminckx's Solution. An aqueous solution containing calcium polysulphides equivalent to from 4 to 5 per cent. w/v of sulphur.

CAMBOGIA
(Cambog.)
Gamboge

Gamboge consists of the gum-resin obtained from *Garcinia Hanburyi* Hook. f. (Fam. Guttiferæ), a tree growing in Siam, Cambodia and the Southern part of Cochin China.

The gum-resin occurs in solid or hollow rolls or sticks (pipe gamboge), 2·5 to 5 centimetres in diameter and 10 to 20 centimetres long, exhibiting longitudinal striations derived from the inner surface of the bamboo in which the drug has been dried; lump or cake gamboge consists of pipe gamboge bent and pressed, while soft, into a cake. The fractured surface is smooth, with a dull gloss and a uniform brownish-orange colour. It has no odour, but an acrid taste. Gamboge forms with water a yellow emulsion which, on the addition of ammonia, becomes almost clear and of a deep orange-red colour. The drug is almost completely dissolved by treatment with alcohol and water successively. A thin splinter, mounted in oil and examined **microscopically,** shows a ground-mass of gum in which are scattered small granules of resin, an occasional crystal of calcium oxalate and a few starch grains.

Gamboge **contains** from 70 to 80 per cent. of resin, from which α, β and γ garcinolic acids have been isolated, and from 15 to 25 per cent. of a gum analogous to acacia and containing an oxydase.

Standard.—Gamboge yields to alcohol (90 per cent.) not less than 70 per cent. of extractive. Ash, not more than 3 per cent.

Action and Uses.—Gamboge is a powerful hydragogue cathartic, causing in large doses much irritation and griping. It is employed in dropsical conditions and in cerebral congestion when it is desirable to lower blood pressure rapidly, but is rarely used alone on account of its drastic action. It is usually **administered** in pills.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

CAMBOGIA INDICA.—Indian gamboge is obtained from *Garcinia Morella* Desr. It has an action similar to that of gamboge, and is used as an equivalent of gamboge in India and the Eastern Colonies. Saigon gamboge is occasionally imported as short, thick, cylindrical cakes wrapped in palm leaves.

CAMPHORA
(Camph.)
Camphor

$C_{10}H_{16}O = 152·1$

Camphor is a crystalline ketonic substance obtained from the wood of *Cinnamomum Camphora* Nees and Eberm., a tree growing abundantly in Formosa, Japán and China, or it may be prepared synthetically.

In the extraction of natural camphor, the wood, in small pieces, is subjected to a process of steam distillation; the crude camphor thus obtained contains a varying quantity of oil of camphor and is purified by sublimation. Synthetic camphor may be obtained from the pinene of oil of turpentine by conversion into camphene and subsequent oxidation. Synthetic camphor is the optically inactive *dl*-form; natural camphor is dextrorotatory.

Camphor occurs as a colourless, transparent, crystalline solid. According to the manner of condensation, it is known as "bells" or "flowers of camphor"; "blocks" and "tablets" are obtained by compression of the powder or by sublimation. The specific gravity of camphor is about 0·995. It has a characteristic, aromatic odour and a pungent, aromatic taste followed by a sensation of coldness. It burns with a bright, smoky flame, volatilises at ordinary temperatures and sublimes when heated. It may readily be powdered by trituration with a few drops of alcohol (90 per cent.) or other volatile, organic solvent. Camphor should be **stored** in a well-closed container in a cool place.

Soluble in water (about 1 in 700), alcohol (90 per cent.) (1 in 1), chloroform (1 in 0·25), ether (about 1 in 0·6), oil of turpentine (1 in 1·5), olive oil (1 in 3) and in other fixed vegetable oils.

Standard, B.P.—Camphor has a melting-point of 174° to 177°. Residue on volatilisation, not more than 0·05 per cent. It complies also with a limit test for water.

Action and Uses.—When applied externally, camphor dilates the vessels of the skin and is used as a rubefacient and mild counter-irritant. Internally, camphor has much the same action as the volatile oils and is prescribed as a carminative in flatulence. It mildly excites the circulation, dilating the superficial vessels and slightly increasing the cardiac output. It also directly excites the cerebrum. It is a popular remedy for the relief of colds. For internal use, camphor is **administered** in the form of Spiritus Camphoræ, and in pills, sometimes combined with dry extract of hyoscyamus, and as essence of camphor (Rubini's essence; an alcoholic solution, 1 in 2½) given on sugar or in milk.

Camphor is given hypodermically as Injectio Camphoræ or Injectio Camphoræ Ætherea as a restorative in collapse, especially in pneumonia and other acute fevers. Its value in these conditions is due to its stimulating effect on the cortex and also on the vasomotor and respiratory centres in the medulla. Solutions of camphor in oil for **injection** may be prepared by dissolving the camphor in olive or almond oil which has been sterilised by heating at 150° for one hour and allowed to cool. The final container is sterilised by heating at 100° for thirty minutes, or at 112° for fifteen minutes. Camphor is a common ingredient of stimulating and anodyne liniments, such as Linimentum Camphoræ or Linimentum Camphoræ Ammoniatum. Camphorated chalk is a popular dentifrice. Stimulating and emollient ointments of camphor for the treatment of chilblains and cracked skin contain about 1 part in 6 parts, with wax, almond oil and sometimes a small percentage of thymol. The liquid obtained by mixing equal weights of camphor

and chloral hydrate is used as an anodyne pigment, sometimes with the addition of cocaine, menthol, or thymol. Camphor is excreted in the urine in combination with glycuronic acid. Toxic doses of camphor cause epileptiform convulsions followed by paralysis. In cases of **poisoning,** an emetic should be administered, stimulants, such as digitalis and strychnine, used freely by injection, and warmth applied to the extremities.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains); 0·06 to 0·2 gramme (1 to 3 grains), by subcutaneous injection.

Preparations

Aqua Camphoræ, B.P.—(Aq. Camph.)—Camphor Water. Camphor, 1 in 1000, and alcohol (90 per cent.), 1 in 500, in distilled water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Aqua Camphoræ Concentrata, B.P.C.—(Aq. Camph. Conc.)—Concentrated Camphor Water. Camphor, 1 in 25. One part added to 39 parts of distilled water yields a preparation which is equivalent in strength to camphor water, but contains 1·5 per cent. v/v of alcohol (90 per cent.). Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Chloral Camphoratum, B.P.C.—(Chloral Camph.)—Camphorated Chloral. *Syn.*—Chloral cum Camphora. Equal weights of chloral hydrate and camphor.

Chloroformum Camphoratum, B.P.C.—(Chlorof. Camph.)—Camphorated Chloroform. *Syn.*—Chloroform of Camphor. Camphor, 2 parts by weight, dissolved in chloroform, 1 part by volume.

Creta cum Camphora, B.P.C.—(Cret. c. Camph.)—Camphorated Chalk. Camphor, 1 in 10, with calcium carbonate.

Injectio Camphoræ, B.P.C.—(Inj. Camph.)—Injection of Camphor. Camphor, 1 in 10, in olive oil. Dose.– 0·5 to 2 millilitres (8 to 30 minims), by subcutaneous injection.

Injectio Camphoræ Ætherea, B.P.C.—(Inj. Camph. Æther.)—Ethereal Injection of Camphor. *Syn.*—Curschmann's Solution. Camphor, 1 in 5, and ether, about 1 in 3, in olive oil. Dose.– 0·25 to 1 millilitre (4 to 15 minims), by subcutaneous injection.

Linctus Camphoræ Compositus, B.P.C.—(Linct. Camph. Co.)—Compound Linctus of Camphor. Camphorated tincture of opium, 1 in 4, with emulsion of chloroform, syrup of wild cherry, oxymel of squill, solution of bordeaux B and concentrated infusion of senega. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Linimentum Camphoræ, B.P.—(Lin. Camph.)—Liniment of Camphor. *Syn.*—Camphorated Oil. A solution of camphor, 20 per cent. w/w, in olive oil (limits, 19 to 21). It should be stored in well-closed containers in a cool place.

Linimentum Camphoræ Ammoniatum, B.P.—(Lin. Camph. Ammon.)—Ammoniated Liniment of Camphor. *Syn.*—Linimentum Camphoræ Compositum; Compound Liniment of Camphor. Camphor, 12·5 per cent. w/v, and strong solution of ammonia, 25 per cent. v/v, in alcohol (90 per cent.) or industrial methylated spirit suitably diluted, perfumed with oil of lavender.

Linimentum Chloroformi, B.P.C.—(Lin. Chlorof.)—Liniment of Chloroform. Chloroform and liniment of camphor, equal parts.

This liniment was included in the British Pharmacopœia, 1914.

Phenol cum Camphora, B.P.C.—(Phenol c. Camph.)—Phenol with Camphor. *Syn.*—Phenol Camphor; Carbolic Camphor. Phenol, 25 per cent. w/w, with camphor.

Pigmentum Chloralis et Camphoræ Compositum, B.P.C.—(Pig. Chloral. et Camph. Co.)—Compound Chloral and Camphor Paint. Equal weights of chloral hydrate, camphor and phenol.

Spiritus Camphoræ, B.P.—(Sp. Camph.)—Spirit of Camphor. Camphor, 10 per cent. w/v, in alcohol (90 per cent.). Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Syrupus Camphoræ Compositus, B.P.C.—(Syr. Camph. Co.)—Compound Syrup of Camphor. Camphor, 0·04 per cent. w/v, vinegar of squill and vinegar of ipecacuanha, of each 6·25 per cent. v/v, with oil of anise, benzoic acid, glacial acetic acid, tincture of opium, sucrose, solution of burnt sugar and distilled water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tinctura Opii Camphorata, B.P.—(Tinct. Opii Camph.)—Camphorated Tincture of Opium. *Syn.*—Tinctura Opii benzoica I.A.; Tinctura Camphoræ Composita; Compound Tincture of Camphor; Paregoric; Paregoric Elixir. Tincture of opium, 5 per cent. v/v, with benzoic acid, camphor, oil of anise and alcohol (60 per cent.). It contains 0·05 per cent. w/v of morphine, calculated as anhydrous morphine (limits, 0·045 to 0·055); 4 millilitres contains 0·002 gramme and 1 fluid drachm contains about $\frac{1}{37}$ grain of morphine. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Unguentum Camphoræ, B.P.C.—(Ung. Camph.)—Camphor Ointment. Camphor, 10 per cent., in white soft paraffin.

Unguentum Camphoræ Durum, B.P.C.—(Ung. Camph. Dur.)—Hard Camphor Ointment. *Syn.*—Camphor Ice. Camphor, 6 per cent., in hard and soft paraffins.

CAMPHORÆ MONOBROMIDUM

(Camph. Monobrom.)

Camphor Monobromide

$C_{10}H_{15}OBr. = 231·0$

Synonyms–Monobromated Camphor; Monobrom-Camphor.

Camphor monobromide is 3-bromocamphor and may be prepared by the action of bromine on camphor. It occurs in colourless, prismatic needles or scales, with a weak, but persistent, camphoraceous odour and taste. It boils at about 274°, volatilising completely with partial decomposition. Camphor monobromide evaporates slowly with the vapour of boiling water. It is permanent in air. It dissolves without decomposition in cold sulphuric acid and is precipitated on pouring the solution into water. Sodium amalgam reduces it to camphor. When heated with silver nitrate and nitric acid it is decomposed with production of silver bromide.

Insoluble in water; readily soluble in alcohol (1 in 12), ether (1 in 2), chloroform (10 in 7) and olive oil (1 in 8); sparingly soluble in glycerin.

Standard.—Camphor monobromide melts between 74° and 76°. Ash, not more than 0·05 per cent. 0·5 gramme shaken with 10 millilitres of water yields a filtrate which is neutral to litmus, and produces no appreciable opalescence on the addition of silver nitrate solution (limit of soluble bromide).

Action and Uses.—Camphor monobromide is used as a sedative and hypnotic, especially in chorea, hysteria and delirium tremens. Its use in large doses requires caution, since it may cause epileptiform convulsions. Its disadvantages are its unpleasant taste and smell and its irritant effect on the stomach. It may be **administered** in capsules or pills, or dissolved in oil and emulsified. Solutions in oil for **injection** may be prepared by dissolving the camphor monobromide in olive or almond oil which has been sterilised by heating at 150° for one hour and allowed to cool. The final container is sterilised by heating at 100° for thirty minutes.

Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

CANELLA
(Canell.)
Canella

Synonyms—Canella Bark; Canellæ Cortex; Wild Cinnamon Bark.

Canella consists of the bark from the trunk and branches of *Canella alba* Murray (Fam. Canellaceæ), a small tree indigenous to the West Indian Islands and to Florida. A thick, outer layer of ash-grey cork is first removed from the bark by gentle beating; this also loosens the remainder of the bark which is then stripped off and dried.

The bark occurs in simple quills or channelled pieces of variable size, but commonly 6 to 25 millimetres wide, 5 to 20 centimetres long and up to 3 millimetres thick; the outer surface is pale buff in colour, hard, wrinkled and marked with whitish spots; the internal surface is paler and finely striated longitudinally; the fracture is short and granular. The smoothed transverse surface exhibits a narrow, irregular, semi-translucent, yellowish-brown phelloderm, a paler cortex containing yellow oil cells and a secondary phloem with yellowish-white medullary rays arranged in somewhat triangular groups. The odour is aromatic and cinnamon-like, and the taste somewhat bitter and pungent.

The diagnostic **microscopical** characters are the phelloderm, which consists of stone cells strongly thickened on the radial and inner walls; numerous oil cells in the cortex and phloem; the simple or 2- to 3-compound starch grains, individual grains being up to 20 microns (usually about 5 to 10 microns) in diameter; the cluster-crystals of calcium oxalate in the medullary rays and scattered through the cortex; the occasional pericyclic fibres and the absence of bast fibres.

Canella **contains** volatile oil, which is present to the extent of about 1 per cent. and contains eugenol, cineol and terpenes. The bark also contains a bitter principle which has not been isolated; tannin is absent.

Standard.—Canella contains not more than 2 per cent. of foreign organic matter. Acid-insoluble ash, not more than 2 per cent.

Canella, in powder (Pulvis Canellæ : Pulv. Canell.), contains the constituents and possesses the diagnostic microscopical characters of Canella, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Canella is an aromatic bitter. A mixture of the powdered bark with aloes is sold under the name "Hiera Picra" (see Pulvis Aloes et Canellæ) and is used as an emmenagogue.

Preparation

Pulvis Aloes et Canellæ, B.P.C.—(Pulv. Aloes et Canell.)—Aloes and Canella Powder. *Syn.*– Hiera Picra. Aloes, 4 parts, and canella, 1 part. Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

CANNABIS
(Cannab.)

Cannabis

Synonyms—Cannabis Indica; Indian Hemp; Ganjah; Guaza.

Cannabis consists of the dried flowering and fruiting tops of the pistillate plant of *Cannabis sativa* Linn. (Fam. Cannabinaceæ), an annual diœcious herb indigenous to Central Asia and the Northern and Western Himalayas, and cultivated mainly in tropical districts of India, Africa and North America.

Cannabis occurs in flattened, dull green masses which remain more or less compacted together by the adhesive resinous secretion. The tops vary in length from about 3 to 30 centimetres, the smaller tops being preferred; they consist of the upper part of the stem with ascending branches, which are longitudinally furrowed and bear numerous covering and glandular trichomes. The leaves are alternate and consist of simple or palmately compound bracts, each having two linear stipules and bearing in its axil two bracteoles, each of which subtends a single pistillate flower or a more or less developed fruit occasionally containing an oily seed. The taste is very slight and the odour somewhat heavy and narcotic.

The diagnostic **microscopical** characters are the conical, curved, unicellular cystolith-trichomes with enlarged bases; the similar but more slender trichomes without cystoliths; the numerous, usually 8-celled, rosette-shaped, glandular trichomes with either unicellular or multiseriate pedicels; the bracteoles with very numerous small cluster-crystals of calcium oxalate; the red stigmas with long cylindrical papillæ; laticiferous tubes with brown contents; occasional, more or less lignified, phloem fibres from the stem, and brown, thick-walled, pitted cells from the palisade layer of the pericarp.

Cannabis **contains** a soft, brown resin (cannabinone), the chief constituent of which is cannabinol, $C_{21}H_{26}O_2$, a viscid, reddish oil, possessing a powerful narcotic action, but resinifying and becoming less active on exposure to air; choline, and traces of volatile oil, fat and

wax are also present. Cannabis yields to alcohol (90 per cent) from 10 to 22 per cent. of extractive. The ash is about 15 per cent. The following test has been used for the identification of cannabis:—Shake 0·1 gramme in powder with 5 millilitres of light petroleum for three minutes and filter; to 1 millilitre of the filtrate add 2 millilitres of a 15 per cent. w/v solution of hydrogen chloride in dehydrated alcohol; at the junction of the two liquids a red colouration appears, and, after shaking, the upper layer becomes colourless and the lower layer acquires an orange-pink colouration which disappears on the addition of one millilitre of water.

Varieties.—Tinctures of cannabis, prepared from African, American, German and Indian varieties of the drug, when examined by oral administration to cats, appear to possess about the same degree of activity, and this activity is not destroyed by long storage of the drug in a dry condition.

Standard.—Cannabis contains not more than 10 per cent. of fruits, large foliage leaves, and stems over 3 millimetres in diameter, and not more than 2 per cent. of other foreign organic matter. Acid-insoluble ash, not more than 5 per cent. When a mixture of 10 grammes of finely powdered cannabis and 100 millilitres of alcohol (90 per cent.) is shaken occasionally during twenty-four hours and then filtered, 20 millilitres of the filtrate, evaporated in a flat-bottomed dish, yields a residue weighing, when dried at 100°, not less than 0·20 gramme. Cannabis indicæ herba I.A. consists of the tops, in flower and in fruit, of the female plant cultivated in the East Indies.

Cannabis, in powder (Pulvis Cannabis : Pulv. Cannab.), contains the constituents and possesses the diagnostic microscopical characters of Cannabis, and complies with the limits for acid-insoluble ash and residue on extraction with alcohol (90 per cent.) of the unground drug.

Action and Uses.—Cannabis acts chiefly on the central nervous system. It first produces excitement with hallucinations, a feeling of happiness and indifference to surroundings, this stage being followed by deep sleep. The hallucinations include inability to estimate time and space. In the East the hemp is smoked and almost immediately produces symptoms of pleasurable excitement, followed by depression and lethargy. Cannabis is used as an anodyne sedative or hypnotic in mania, spasmodic coughs, phthisis, asthma and dysmenorrhœa. It has been used in the treatment of chorea and paralysis agitans. It does not produce constipation or loss of appetite. Cannabis is usually **administered** as the extract in pills, or as tincture. In cases of **poisoning** the stomach should be evacuated and the usual methods adopted to prevent collapse and respiratory failure.

CANNABINÆ TANNAS.—Cannabine tannate is a brownish powder which may be obtained from an aqueous extract of cannabis by precipitation with tannic acid. It has been used as a hypnotic in nervous insomnia, in dysmenorrhœa and in menorrhagia. Dose.– 0·25 to 0 5 gramme (4 to 8 grains).

CANNABINONUM.—Cannabinone, the brown resin obtained from cannabis, has been used as a hypnotic in hysteria and insomnia. Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

Preparations

Extractum Cannabis, B.P.C.—(Ext. Cannab.)—Extract of Cannabis. A soft extract. Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

This extract, prepared from Indian hemp, was included in the British Pharmacopœia, 1914, under the name of Extractum Cannabis Indicæ.

Extractum Cannabis indicæ I.A. is prepared from cannabis cultivated in the East Indies.

Tinctura Cannabis, B.P.C.—(Tinct. Cannab.)—Tincture of Cannabis. Extract of Cannabis, 1 in 20. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This tincture, prepared from Indian Hemp, was included in the British Pharmacopœia, 1914, under the name of Tinctura Cannabis Indicæ.

Tinctura Cannabis indicæ I.A. is prepared with alcohol (90 per cent.) from 10 per cent. of cannabis cultivated in the East Indies.

CANTHARIDINUM

(Cantharidin.)

Cantharidin

$C_{10}H_{12}O_4 = 196·1$

Cantharidin is the lactone of cantharidic acid and is obtained from cantharides or mylabris. The insects are crushed and the powder digested for two days in a mixture of sulphuric acid and ethyl acetate; the product is mixed with barium carbonate and extracted with light petroleum. The latter is then removed and the residue set aside for the cantharidin to crystallise. The crystals are warmed with light petroleum to remove fat, and the cantharidin recrystallised from alcohol. It occurs in colourless, odourless, glistening crystals which sublime at about 120°. It dissolves in solutions of alkali hydroxides with formation of cantharidates and is reprecipitated on the addition of acid.

Very slightly **soluble** in water; soluble in alcohol (90 per cent.) (about 1 in 1100), ether (1 in 700), chloroform (1 in 55), acetone (1 in 40), ethyl acetate (1 in 150), and fixed oils.

Standard, B.P.—Cantharidin has a melting point of 216° to 218°. Ash, not more than 0·1 per cent. It complies also with a limit test for readily carbonisable substances.

Action and Uses.—Cantharidin, which is very irritating to the skin and mucous membrane, should be used with great care. After absorption it produces marked vasoconstriction and, during excretion, it gives rise to irritation of the kidneys and urinary tract. It may be **administered** in the form of Liquor Cantharidini but is rarely used internally. It possesses aphrodisiac properties. It is, however, chiefly used externally as a blistering agent and counter-irritant, Collodium Vesicans, Emplastrum Cantharidini and Unguentum Cantharidini being suitable preparations for this purpose. Liquor Epispasticus is painted on the skin as a vesicant to relieve inflammation in deep-seated parts, as in pleurisy, pericarditis and mastoid inflammation, and for

neuralgia. Emplastrum Calefaciens is a milder preparation which may be used where a rubefacient rather than a vesicant is indicated.

Cantharidin is also used in hair lotions, owing to its supposed stimulating action on the growth of the hair. In acid hair lotions, Acetum Cantharidini is a suitable preparation for inclusion, while Liquor Cantharidini is preferable for addition to ammoniacal lotions. Cantharidin in the form of ointment is also used for application to the scalp. In cases of **poisoning** by cantharidin, emetics should be given, and the stomach pump applied, followed by mucilaginous drinks with ice; oils and fats should be avoided.

Preparations

Acetum Cantharidini, B.P.C.—(Acet. Cantharidin.)—Vinegar of Cantharidin. Cantharidin, 1 in 2000, with glacial acetic acid and acetic acid.

This vinegar was included in the British Pharmacopœia, 1914.

Collodium Vesicans, B.P.C.—(Collod. Vesic.)—Blistering Collodion. Blistering liquid containing pyroxylin, 1 in 40, coloured with cochineal.

This collodion was included in the British Pharmacopœia, 1914.

Emplastrum Calefaciens, B.P.C.—(Emp. Calefac.)—Warming Plaster. Cantharidin, 1 in 5000, in olive oil and plaster of colophony, prepared with chloroform.

This plaster was included in the British Pharmacopœia, 1914.

Emplastrum Cantharidini, B.P.—(Emp. Cantharidin.)—Plaster of Cantharidin. *Syn.*—Cantharidin Plaster; Blistering Plaster. Cantharidin, 0·2 per cent., with castor oil, yellow beeswax and wool fat, prepared with acetone.

Liquor Cantharidini, B.P.C.—(Liq. Cantharidin.)—Solution of Cantharidin. *Syn.*—Tinctura Cantharidini; Tincture of Cantharidin. Cantharidin, 1 in 10,000, in chloroform and alcohol (90 per cent.). Dose.– 0·12 to 0·3 millilitre (2 to 5 minims).

This solution was included in the British Pharmacopœia, 1914, *under the name of Tinctura Cantharidini.*

Tinctura Cantharidis I.A. is prepared with alcohol (70 per cent.) and contains 0·06 per cent. of cantharidin.

Liquor Epispasticus, B.P.—(Liq. Epispast.)—Blistering Liquid. Cantharidin, 0·4 per cent. w/v, with castor oil and colophony, in acetone.

Lotio Cantharidini, B.P.C.—(Lot. Cantharidin.)—Cantharidin Lotion. *Syn.*—Lotio Crinalis Stimulans. Cantharidin, 1 in 5000, with acetone and castor oil, in alcohol (90 per cent.).

Unguentum Cantharidini, B.P.C.—(Ung. Cantharidin.)—Cantharidin Ointment. Cantharidin, 0·033 per cent., with chloroform, in benzoinated lard.

This ointment was included in the British Pharmacopœia, 1914.

CANTHARIS

(Canthar.)

Cantharides

Synonyms—Spanish Fly; Blistering Beetle.

Cantharides consists of the dried beetle, *Cantharis vesicatoria*

Latr. (Order Coleoptera; Fam. Meloidæ), which is widely distributed over Southern Europe, living gregariously in olive trees, ash trees, etc. The beetles are collected before sunrise, when unable to use their wings, by shaking them from the trees on to cloths spread underneath; they are then killed by means of ammonia, vinegar, sulphur dioxide or by stove heat. The drug should be **stored** in containers which prevent access of moisture.

The beetles are from 12 to 20 millimetres long and 3 to 6 millimetres broad, smooth and of a shining green or bronze-green colour. The head is trapezoid, and the eyes small and near the antennæ. The posterior margin of the vertex of the head shows a median groove; the prothorax is hexagonal; the elytra are wider than the prothorax, almost glabrous, and meet in a straight line down the centre; the hind wings are brown and membranous. The antennæ are filiform, with eleven joints; the second joint is very small and sub-globular; the third joint is a little longer than the fourth, but is never as much as twice as long. The tarsi of the fore and middle legs have five joints, while those of the hind legs have four joints; none of the joints is bilobed. There are two pairs of smooth, terminal claws on each foot, the external ones being strong and robust while the internal ones are delicate.

The diagnostic **microscopical** characters of cantharides are the abundance of groups of striated muscle fibres; the portions of glabrous elytra showing in surface view a delicate polygonal net work, beneath which are scattered, brown, circular areas, each surrounded by a double concentric ring; fragments of the legs, antennæ and other limbs and of the exoskeleton bearing hairs of various shapes and sizes. The dry powder viewed microscopically by reflected light exhibits bright green particles from the elytra.

Cantharides **contains** cantharidin, a crystalline lactone, of which commercial specimens yield from 0·4 to 0·8 per cent. It exists in the beetles chiefly in the free state, but a varying proportion is combined in the form of salts. The beetles also contain about 12 per cent. of fat and yield about 8 per cent. of ash.

Standard.—Cantharides contains not more than 2 per cent. of foreign organic matter and not more than 10 per cent. of moisture.

Cantharides, in powder (Pulvis Cantharidis : Pulv. Canthar.), contains the constituents and possesses the diagnostic microscopical characters of Cantharis, and complies with the limit for moisture of the unground drug. It is adjusted, if necessary, by the addition of powder of higher or lower cantharidin content to contain not less than 0·6 per cent. of cantharidin. Pulvis Cantharidis I.A. contains not less than 0·6 per cent. of cantharidin.

Assay.—To 15 grammes, in coarse powder, in a stoppered bottle, add 150 millilitres of chloroform and 1 millilitre of hydrochloric acid, and shake frequently during twenty-four hours. Filter and evaporate 100 millilitres of the filtrate (equivalent to 10 grammes of the drug) in a porcelain dish, avoiding unnecessary heat. Add 10 millilitres of light

petroleum, stir with a glass rod, allow to settle, and pour through a plug of cotton wool. Continue washing with 5 millilitre portions of light petroleum until the washings are colourless, and the fat is removed. Transfer all particles adhering to the cotton wool back into the dish by means of a few millilitres of chloroform, evaporate the chloroform, add 5 millilitres of N/1 sodium hydroxide and rub into a smooth cream, ensuring that all parts of the dish are covered. Now add 10 millilitres of a 5 per cent. solution of potassium permanganate and warm on the steam-bath for ten minutes, stirring frequently. Allow to cool, and transfer the contents of the dish to a separator; add 4 millilitres of 40 per cent. sulphuric acid to the dish, stir well, and after two minutes transfer to the separator; add 30 millilitres of chloroform to the dish, stir thoroughly and transfer to the separator, and finally wash the dish with a few millilitres of water. Add to the contents of the separator 5 grammes of ferrous sulphate in small crystals and shake vigorously for five minutes. Separate the chloroform and shake the acid liquid with two successive portions of 30 millilitres of chloroform. Evaporate the chloroform at a temperature not exceeding 65°, dry and weigh the residue.

Action and Uses.—Cantharides and its preparations, when applied to the skin, produce redness followed by vesicles, which coalesce to form a blister. Externally, preparations of cantharides are used as rubefacients, counter-irritants, and vesicants. They should not be applied over very large surfaces on account of the risk of absorption, especially when there is renal disease. Cantharides is now largely replaced by cantharidin, thereby ensuring preparations of a more uniform strength. In cases of **poisoning,** the same treatment should be adopted as in cases of poisoning by Cantharidinum.

Preparations

Acetum Cantharidis, B.P.C.—(Acet. Canthar.)—Vinegar of Cantharides. Cantharides, 1 in 10, extracted with a mixture of glacial acetic acid and water.

Emplastrum Lyttæ, B.P.C.—(Emp. Lyttæ)—Plaster of Cantharides. Cantharides, about 1 in 3, with yellow beeswax, lard, colophony and plaster of soap.

CAOUTCHOUC
(Caoutchouc)
Rubber

Rubber consists of the prepared latex of *Hevea brasiliensis* Müll. Arg. (Fam. Euphorbiaceæ), and other species of *Hevea* indigenous to Brazil and cultivated in the Malay Archipelago, Ceylon and elsewhere. The latex is obtained by making a series of incisions in the bark of the tree ("tapping") and collecting the comparatively limpid fluid in suitable vessels placed beneath them. In Brazil, "Pará rubber" is prepared by coagulating the latex in successive layers on a stick or paddle held in the smoke of burning palm nuts. The latex obtained from cultivated

trees is usually preserved by the addition of ammonia, until a sufficient quantity has been collected for transfer to a central factory where it is coagulated with dilute acid or alum solution, after which the liquid portion is pressed out and the rubber dried ("plantation rubber").

Pará rubber occurs in flattish masses of various sizes, brownish-black externally, paler internally, exhibiting, in section, a series of thin concentric layers, separated by darker lines. Plantation rubber occurs in the form of thin sheets (sheet or crêpe rubber), discs (biscuit rubber), or masses (block rubber), and is usually of a lighter colour than Pará rubber. Rubber has a characteristic odour and is almost tasteless. It possesses considerable elasticity, which is gradually lost on prolonged storage. When heated to 125°, it melts and remains soft and adhesive after cooling. When treated with benzol, carbon disulphide, chloroform, mineral naphtha, or oil of turpentine, rubber swells, becoming soft and gelatinous.

Rubber **contains** from 40 to 60 per cent. of the hydrocarbon caoutchouc, 30 to 50 per cent. of a gelatinous substance, and 1 to 4 per cent. of various other constituents, such as resin, fat, colouring matters and mineral substances. Pure caoutchouc is a white, amorphous substance of the empirical formula, C_5H_8, and appears to be an isomeride of gutta. When subjected to dry distillation, it yields "oil of caoutchouc"—a mixture of hydrocarbons, including isoprene, dipentene, etc.

Substitutes.—Assam rubber from *Ficus elastica* Roxb. (Fam. Moraceæ) occurs as dark red masses. Mangabeira rubber from *Hancornia speciosa* Gomez (Fam. Apocynaceæ) is in the form of large, pinkish-white pieces. Central American rubber, from *Castilloa elastica* Cerv. and other species of *Castilloa* (Fam. Moraceæ), is in black slabs composed of a mass of wavy sheets. West African rubber is obtained from *Funtumia elastica* Stapf and *Landolphia florida* Benth. (Fam. Apocynaceæ). Mozambique rubber from *Landolphia Kirkii* Dyer (Fam. Apocynaceæ) occurs in balls or sausage-shaped masses. Ceara rubber from *Manihot Glaziovii* Müll. Arg. (Fam. Euphorbiaceæ) consists of strings rolled into balls.

Uses.—Rubber is a constituent of the bases of self-adhesive plasters, with which medicaments, such as zinc oxide, belladonna, capsicum, etc., are incorporated. Liquor Caoutchouc is a solution of 1 part of rubber in 20 parts of equal volumes of benzene and carbon disulphide; mixed with powdered mustard seed (freed from fixed oil), it is used in the preparation of Charta Sinapis. Solutions of gutta percha are much to be preferred to those of rubber for the application of such medicaments as chrysarobin and resorcinol to the skin when close and prolonged contact is required. The rubber film is moist and sticky, that of gutta percha is dry and hard.

Preparations

Emplastrum Adhesivum, B.P.C.—(Emp. Adhesiv.)—Rubber Adhesive Plaster. This plaster is spread with a rubber adhesive compound containing not more than 25 per cent. of fillers.

Ligamentum Elasticum Adhesivum, B.P.C.—(Ligament. Elastic. Adhesiv.) Elastic Adhesive Bandage. This bandage is spread with a rubber adhesive compound containing not less than 20 per cent. of zinc oxide.

CAPSICUM

(Capsic.)

Capsicum

Synonyms.—Capsici Fructus; Capsicum Fruit.

Capsicum consists of the dried, ripe fruits of *Capsicum minimum* Roxb. (Fam. Solanaceæ), a small, erect shrub indigenous to tropical America and cultivated in Africa (Sierra Leone and Zanzibar), South America and other tropical countries.

The fruits are of a dull orange-red colour and oblong-conical shape; they are obtuse at the apex, two-celled, and vary from about 12 to 25 millimetres in length and up to about 7 millimetres in diameter at the widest part. Occasionally the fruits are attached to a 5-toothed, inferior calyx and a straight, slender pedicel, the length of pedicel and calyx being about 2 to 3 centimetres. The pericarp is somewhat shrivelled, glabrous, translucent and leathery; it encloses about 10 to 20 flat, reniform seeds; the seeds are about 3 to 4 millimetres in length and occur either loose or attached to a reddish dissepiment. Capsicum has a characteristic, but not powerful, odour and an extremely pungent taste. The pungency is not destroyed by boiling with 2 per cent. alcoholic potash solution (distinction from ginger).

The diagnostic **microscopical** characters are the outer epidermal cells of the pericarp often arranged in rows of five to seven, the walls being straight, moderately and uniformly thickened, and exhibiting a uniformly striated cuticle; the droplets of red oil in many of the parenchymatous cells of the pericarp; the characteristic inner epidermis of the pericarp showing groups of sclerenchymatous cells separated by thin-walled parenchyma; the epidermis of the seed, composed of very large sinuous cells with thin outer walls, but strongly thickened and pitted radial and inner walls.

Capsicum **contains** the crystalline, colourless, pungent principle, capsaicin, $C_{18}H_{27}O_3N$, of which about 0·14 per cent. is present. It melts at 64·5° and is volatile at higher temperatures, the vapour being extremely irritating; it can be extracted from acid solution by means of ether. The fruit also contains a fatty oil, red colouring matter and traces of a liquid alkaloid, none of which is pungent. It yields to alcohol (60 per cent.) from 20 to 25 per cent. of extractive and to acetone about 10 per cent. The seeds may contain traces of starch.

Varieties.—The fruits of *Capsicum minimum* are known commercially as African chillies. Sierra Leone capsicum is regarded as the most pungent; the pod is somewhat slender and of a bright colour. Nyasaland capsicum closely resembles the Sierra Leone, but is brighter in colour and more free from stalk. Zanzibar capsicum is usually duller in colour; it usually contains more stalks and the pods are somewhat shorter and broader. Madagascar capsicum is almost free from stalks, yellow to orange-red in colour, and rather broader.

Substitutes and Adulterants.—Japanese chillies possess about one quarter of the pungency of the African varieties, but are valued for their very bright colour. They are probably derived from *C. frutescens* Linn. and are distinguished from the official drug by their very bright reddish colour and freedom from stalk; the cells

of the epidermis of the pericarp have a smooth cuticle, strongly thickened walls and radiate lumen; the cells of the single layered hypoderma have somewhat thick, pitted, cuticularised walls. Bombay chillies are obtained from *C. annuum* Linn.; the fruits vary in size and shape, are very broadly ovate and larger but less pungent than the official drug. The stalk is usually bent, the calyx larger, the pericarp leathery, and the dissepiment does not usually extend throughout the entire length of the fruit. The epidermal cells are larger and polygonal in outline and have numerous pits; the hypoderma consists of several layers of cuticularised collenchymatous cells. Natal chillies are much larger, averaging about 8 centimetres in length The pericarp is transparent and red Paprika is extensively grown and used in Hungary and is derived from mild races of *C. annuum*; the fruits are large and more or less tetragonal and have a conspicuous green calyx. Bird pepper is derived from *C. annuum* var. *grossum*, grown in Spain and other milder races of *C. annuum* grown in Hungary, and is free from pungency.

Standard, B.P.—Capsicum contains not more than 3 per cent. of calices and pedicels, and not more than 1 per cent. of stalks and other foreign organic matter. Ash, not more than 7 per cent.

Capsicum, in powder (Pulvis Capsici : Pulv. Capsic.), contains the constituents and possesses the diagnostic microscopical characters of Capsicum, and complies with the limit for ash of the unground drug.

Action and Uses.—Capsicum is given **internally** as a powerful stimulant and carminative to the alimentary canal, especially in flatulent dyspepsia. For internal use, tincture of capsicum is administered with bitters and tonics; it is sometimes added to tannin or rose gargles for pharyngitis and relaxed sore throat. Capsicum is sometimes used with other drugs such as nux vomica or cinchona in the treatment of alcoholism. When its pungent taste is objectionable, powdered capsicum may be dispensed in pills with compound rhubarb pill or reduced iron. **Externally,** capsicum is an irritant, producing warmth, redness and vesication. It is used for rheumatism, lumbago, neuralgia and generally where counter-irritation is indicated. The tincture is too weak for external use; for this purpose the strong tincture (Tinctura Capsici Fortior) and liniment are preferred. These are used by painting on the skin, or by sprinkling on lint or cellulose wadding and applying to the part.

Capsicum ointments, simple or compound, are used for application to painful joints in synovitis and rheumatoid arthritis. Capsicum wool and tissue have been found of service as applications to rheumatic joints and to the chest; in bronchial inflammation they have a mild rubefacient action on the skin. Capsicum plasters are prepared in several forms, such as very small plasters on thin felt for application to the gums as a counter-irritant, capsicum plasters with a soap basis, prepared with oleoresin of capsicum, and the same, self-adhesive, in rubber combination for application to the back, chest, or wherever counter-irritation may be required.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

Preparations

Emplastrum Capsici, B.P.C.—(Emp. Capsic.)—Plaster of Capsicum. Oleoresin of capsicum, 1 in 50, with plaster of colophony.

Emplastrum Capsici Elasticum, B.P.C.—(Emp. Capsic. Elast.)—Rubber Plaster of Capsicum. Oleoresin of capsicum, 1 in 50, with rubber adhesive plaster.

Gossypium Capsici, B.P.C.—(Gossyp. Capsic.)—Capsicum Wool. This wool contains the equivalent of about 20 per cent. of capsicum.

Linimentum Capsici, B.P.C.—(Lin. Capsic.)—Liniment of Capsicum. Stronger tincture of capsicum, about 1 in 3, with oleic acid, oil of lavender and alcohol (90 per cent.).

Oleoresina Capsici, B.P.C.—(Oleores. Capsic.)—Oleoresin of Capsicum. *Syn.*—Capsicin; Extract of Capsicum The alcohol-soluble portion of the ether extractive of capsicum. It is approximately four times the strength of the oleoresin of the British Pharmaceutical Codex, 1923. Dose.—0·0006 to 0·002 gramme ($\frac{1}{100}$ to $\frac{1}{30}$ grain).

Tela Carbasi et Gossypii Capsici. B.P.C.—(Tel. Carbas. et Gossyp. Capsic.)—Capsicum Tissue. Capsicum tissue consists of capsicum wool enclosed in absorbent gauze.

Tinctura Capsici, B.P.—(Tinct. Capsic.)—Tincture of Capsicum. 1 in 20 prepared by maceration with alcohol (60 per cent.). Dose.—0·3 to 1 millilitre (5 to 15 minims).

Tinctura Capsici Fortior, B.P.C.—(Tinct. Capsic. Fort.)—Stronger Tincture of Capsicum. *Syn.*—Turnbull's Tincture of Capsicum. 1 in 3. Dose.—0·06 to 0·2 millilitre (1 to 3 minims).

Unguentum Capsici, B.P.—(Ung. Capsic.)—Ointment of Capsicum. *Syn.*—Capsicum Ointment. It contains active constituents approximately equivalent to 25 per cent. w/w of capsicum, extracted by digestion in a mixture of lard and hard and soft paraffins.

Unguentum Capsici Compositum, B.P.C.—(Ung. Capsic. Co.)—Compound Capsicum Ointment. *Syn.*—Unguentum Oleoresinæ Capsici Compositum; Compound Capsicum Oleoresin Ointment; Chillie Paste. Oleoresin of capsicum, 2 per cent., with menthol, chloral hydrate and camphor, in yellow soft paraffin.

Unguentum Capsici Forte, B.P.C.—(Ung. Capsic. Fort.)—Strong Capsicum Ointment. *Syn.*—Unguentum Oleoresinæ Capsici; Capsicum Oleoresin Ointment. Oleoresin of capsicum, 4·5 per cent., with yellow beeswax and benzoinated lard.

CARBO
(Carbo)
Charcoal

Synonyms—Carbo Ligni; Medicinal Charcoal; Purified Charcoal.

Charcoal consists of the carbonaceous residue of wood charred by exposure to a red heat without access of air, the wood of the beech, oak, poplar, hazel, dogwood and willow usually being used for the purpose. Willow charcoal is most commonly used in this country. The yield of charcoal is from 17 to 18 per cent. when the wood is simply protected from the air with earth and sods, and from 22 to 23 per cent. when charred in iron cylinders. Charcoal is also prepared in a more active condition from other material, including coconut shells, by heating in a current of activating gases, in the presence of certain inorganic salts. The product is washed free from mineral matter and dried. It occurs

as a black, tasteless and odourless powder. It should be **stored** in well-closed containers.

Standard.—Charcoal leaves not more than 7 per cent. of ash. The filtrate, obtained by boiling 1·5 grammes with 15 millilitres of distilled water and 5 millilitres of potassium hydroxide solution for thirty seconds and filtering, is not coloured more than light brown. Moisture, not more than 15 per cent. Boil 5 grammes with a mixture of 5 millilitres of dilute hydrochloric acid and 20 millilitres of water; dilute with water to 100 millilitres, filter, and apply the following tests:—Mix 10 millilitres of filtrate with an equal volume of saturated aqueous solution of hydrogen sulphide, warm, and allow to stand for thirty minutes; not more than the faintest darkening occurs (limit of heavy metals). To 20 millilitres of filtrate add 5 millilitres of ammonium chloride solution, and solution of ammonia in excess, boil, and filter; no blue colour should be visible in the filtrate; make the filtrate slightly acid with hydrochloric acid and add several drops of potassium ferrocyanide solution; no immediate precipitate is produced (limit of copper and zinc). 2·5 millilitres of filtrate complies with the limit test for iron.

Action and Uses.—Charcoal has the power of adsorbing gases and of removing by adsorption many substances from aqueous solutions. It is used **internally**, alone or with kaolin, as an antiseptic and absorbent in flatulent dyspepsia, intestinal distension, diarrhœa and dysentery. Its action is partly mechanical, removing mucus and stimulating the movements of the stomach and intestine, and partly the result of the adsorption of toxins. Charcoal is also used to indicate the passage of intestinal contents. It is sometimes employed as a poultice.

The powder is usually **administered** in cachets, sometimes with sodium bicarbonate, bismuth carbonate and betanaphthol. Lozenges of charcoal and of charcoal with bismuth are prepared. Charcoal biscuits are a popular form of administration. On account of its high adsorptive power, it has been used largely in respirators as a defence against poison gas, and in pharmacy and the arts for decolourising solutions, but for technical purposes activated charcoal is now preferred.

Dose.– 4 to 8 grammes (1 to 2 drachms).

CARBO ACTIVATUS
(Carbo Activat.)

Activated Charcoal

Synonym—Decolourising Carbon.

Activated charcoal may be prepared from vegetable matter, such as sawdust, cellulose residues and coconut shells, by carbonisation, heating the charcoal to a high temperature, with or without the addition of inorganic salts, in a stream of activating gases, usually steam, and subsequent purification by washing with acids to remove mineral matter. It occurs in the form of a fine, black powder, the commercial

varieties varying widely in their characteristics, some being neutral, others acid or alkaline, depending upon the method of manufacture.

Different varieties are used for different purposes, since a charcoal produced to have the maximum power for adsorbing gases may not be the most efficient for decolourising liquids. Their action is explained by adsorption, and in this respect it is estimated that one cubic inch of a good sample offers a surface of over 20,000 square yards. The comparative activity of various samples may be determined by measuring the number of millilitres of a 0·25 per cent. caramel solution decolourised on shaking 0·1 gramme of activated charcoal with an excess of the caramel solution for one hour at 50°; a decolourisation of not less than 15 millilitres may be considered as a satisfactory test. Good samples yield not more than about 15 per cent. of moisture or 10 per cent. of ash. It should be **stored** in well-closed containers.

Uses.—Activated charcoal is used as a purifying agent in many chemical and pharmaceutical processes, and for the removal of colour from solutions. The precise method of using it depends to a certain extent on the nature of the substance and the reaction of the solution. It is also used for the adsorption of gases and special varieties are of value in removing residual gases in low pressure apparatus. When activated charcoal is used for internal administration it must comply with the requirements for Carbo.

CARBO ANIMALIS

(Carbo Animal.)

Animal Charcoal

Synonyms—Carbo Animalis Purificatus; Purified Animal Charcoal.

Animal charcoal is prepared by boiling crude animal charcoal with hydrochloric acid, washing thoroughly, drying and reheating. It occurs as an odourless, tasteless powder, and may yield as much as 10 per cent. of ash. Crude animal charcoal is the material prepared by heating bones with a limited access of air and consists chiefly of calcium phosphate and other inorganic constituents of bone, with about one-tenth its weight of carbon; it occurs in dull black, granular fragments, or as a dull black, odourless powder.

Uses.—Animal charcoal has been used to decolourise solutions before filtration, but activated charcoal is now preferred for this purpose.

CARBONEI DIOXIDUM

(Carbon. Diox.)

Carbon Dioxide

$CO_2 = 44\ 00$

Carbon dioxide may be obtained from naturally occurring carbonates,

particularly the carbonates of calcium and magnesium, by treatment with an acid, but is more commonly obtained as a by-product of alcoholic fermentation in breweries. It is supplied condensed in metal cylinders. Carbon dioxide is a heavy, colourless, odourless gas which does not support combustion; it is about 1·5 times as heavy as air. The aqueous solution has weakly acidic properties and reddens blue litmus. The gas is readily absorbed by the hydroxides of the alkali and alkaline earth metals with formation of carbonates or bicarbonates; when passed into solution of calcium or barium hydroxide, a white precipitate of the corresponding carbonate is produced. Carbon dioxide can be liquefied by pressure at temperatures below 31°, at which temperature a pressure of 72 atmospheres is required.

Liquid carbon dioxide is a limpid, colourless liquid which is immiscible with water, but readily dissolves in alcohol, ether and volatile oils; at atmospheric pressure it boils at about —72°. Solid carbon dioxide, "dry ice" or "carbon dioxide snow" is prepared extensively and, owing to its low thermal conductivity, it is more stable than the liquid.

Soluble in water (about 1 in 1·3 at 25°).

Standard, B.P.—Carbon dioxide contains not less than 99 per cent. v/v of CO_2. It complies with a test for the absence of carbon monoxide and with limit tests for acid and sulphur dioxide, and for phosphine, hydrogen sulphide and organic reducing substances.

Action and Uses.—Solutions of carbon dioxide, as in the effervescent salines, are used in medicine in order to mask the unpalatable nature of the saline aperients. The action of carbon dioxide on the stomach is to increase the blood flow. It is of value in chronic gastritis as a stimulant to the appetite and to promote the secretion of hydrochloric acid and enzymes. In cases of vomiting, carbon dioxide in solution such as a mixture of sodium bicarbonate and citric acid taken during effervescence, is often a useful measure. The aerated waters are efficient diuretics. Carbon dioxide is a powerful respiratory stimulant. In conjunction with oxygen it is a valuable therapeutic agent in cases of weak or suspended respiration, resulting from, for example, drowning, or coal-gas or morphine poisoning, or to stimulate respiration in newly born infants. It is, of course, necessary to use artificial respiration in the first place when the respiration has ceased. Oxygen with 5 to 10 per cent. of carbon dioxide is used frequently to increase the respiratory movements after a general anæsthetic before consciousness is regained, and it is employed in cases of prolonged unconsciousness from any cause. Post-operative chest complications, such as pneumonia or massive collapse, are less liable to occur if carbon dioxide is administered as a routine. Inhalation of carbon dioxide mixed with oxygen is also used to relieve whooping cough and spasmodic asthma.

The liquefied gas is used industrially for aerating waters, and for refrigerating and other purposes. **Carbon dioxide snow** is obtained by the sudden release of the liquid carbon dioxide from an inverted cylinder. It has a temperature of —80°. The snow is shaped to suit

the part which it is desired to treat by compressing it into suitable moulds. It has a destructive action on tissues and is used to destroy warts and nævi. It is applied with light pressure for from five to sixty seconds according to the condition it is desired to treat. A wheal is afterwards formed, followed by a vesicle, which requires to be treated like a blister. The application is practically painless and, as the pencil may be trimmed to a point, the treatment can be strictly localised. Before making a second application, when necessary, the inflammation resulting from the first should have been allowed to subside. Very little scar is formed when this method is followed.

CARBONEI DISULPHIDUM

(Carbon. Disulph.)

Carbon Disulphide

$CS_2 = 76{\cdot}12$

Synonym—Carbon Bisulphide.

Carbon disulphide is formed by passing the vapour of sulphur over red-hot carbon, the product being condensed and subsequently purified. It occurs as a clear, colourless, highly refractive, limpid liquid, with a characteristic odour. It should not have a fœtid odour. It is volatile and highly inflammable, burning with a blue flame to carbon dioxide and sulphur dioxide. Its flash-point is about — 20°. Its ignition-point is very low, being under 200°. The vapour mixed with air is explosive in contact with flame. Its refractive index at 20° is about 1·628. It decomposes on exposure to light and should be **stored** in well-stoppered bottles in the dark.

Almost **insoluble** in water; readily soluble in alcohol, ether, chloroform and the fixed and volatile oils.

Standard.—Carbon disulphide has a specific gravity of 1·268 to 1·272. Non-volatile residue on evaporation at 100°, not more than 0·01 per cent. Not less than 95 per cent. distils between 46° and 47°. Shaken with half its volume of water, the latter should not be acid to, or bleach, litmus (limit of acids and sulphur dioxide). When shaken with an equal quantity of lead acetate solution, no darkening occurs (limit of foreign sulphur compounds).

Action and Uses.—Carbon disulphide is not given internally to human beings. The vapour is sometimes applied locally to the skin for neuralgia, and to enlarged glands. For this purpose cotton wool placed in a wide-mouthed bottle is saturated with the liquid, and the mouth of the bottle is placed in contact with the part for a few minutes at a time. It is a powerful parasiticide, and is given internally to horses in doses of 8 to 16 millilitres (2 to 4 fluid drachms) for this purpose. Carbon disulphide is used as a solvent for sulphur, phosphorus and rubber.

In chronic **poisoning** by carbon disulphide, symptoms of peripheral neuritis are present, with hæmolysis, leucocytosis and anæmia.

CARBONEI TETRACHLORIDUM

(Carbon. Tetrachlor.)

Carbon Tetrachloride

$CCl_4 = 153{\cdot}8$

Carbon tetrachloride is tetrachloromethane and may be prepared by passing a mixture of carbon disulphide vapour and chlorine through a red-hot porcelain tube; the resulting mixture of sulphur chloride and carbon tetrachloride is freed from the former by distillation with potassium hydroxide or milk of lime. It occurs as a heavy, colourless, volatile liquid, with a characteristic odour recalling that of chloroform, and a burning taste. It is non-corrosive and non-inflammable, but is decomposed by contact with a flame with the production of an acrid odour. When the vapour is introduced into a colourless flame, the latter is tinged green. It should be **stored** in well-closed bottles and protected from light.

Almost **insoluble** in water; miscible with dehydrated alcohol and ether.

Standard, B.P.—Carbon tetrachloride has a specific gravity of 1·603 to 1·606 and a boiling-range of 76·5° to 77·5°. Residue on evaporation on a water-bath, not more than 0·002 per cent. w/w. It complies also with limit tests for free acid, ionisable chloride, free chlorine, sulphur compounds and oxidisable impurities.

Action and Uses.—Carbon tetrachloride, when inhaled, acts as an anæsthetic, but, since it is more toxic than chloroform, it is not used for this purpose. The vapour has caused serious poisoning of a narcotic nature; in some cases, as for instance when inhaled from fire extinguishers containing carbon tetrachloride, the vapour may cause impairment of renal function and consequent suppression of urine. The presence of carbon disulphide increases its toxicity when inhaled. Carbon tetrachloride is used as an anthelmintic, especially for hookworms. To counteract its toxic action on the liver, its use should be preceded by the administration of liberal doses of calcium salts and dextrose, especially in the case of children. Alcohol should be avoided before and after treatment, and food should be withheld shortly before and after administration. It has also been used as a dry shampoo, but its use for this purpose is not unattended by danger, and deaths attributed to its action have been recorded. A solution of iodine in carbon tetrachloride has been used to sterilise the skin before operations. Carbon tetrachloride is also used in the treatment of liver fluke in sheep in doses of 1 millilitre (15 minims), but its use is occasionally followed by fatalities.

Dose.– 2 to 4 millilitres (½ to 1 drachm).

CARBROMALUM
(Carbrom.)
Carbromal

$C_7H_{13}O_2N_2Br = 237{\cdot}0$

Synonym—Uradal.

Carbromal is α-bromo-α-ethylbutyrylcarbamide, $CBr(C_2H_5)_2{\cdot}CO{\cdot}NH{\cdot}CO{\cdot}NH_2$, and may be prepared by the action of α-bromo-α-ethylbutyryl bromide on urea. It occurs as a white, crystalline powder which is almost odourless and tasteless. When heated with dilute sodium hydroxide solution ammonia is evolved and sodium bromide formed.

Soluble in water (about 1 in 3000), more soluble in hot water, alcohol (95 per cent.) (about 1 in 18), ether (about 1 in 14) and chloroform (about 1 in 3); slightly soluble in light petroleum.

Standard, B.P.—Carbromal has a melting-point of 116° to 118°. Ash, not more than 0·05 per cent. It complies also with a test for neutrality and with limit tests for readily carbonisable substances, chloride and sulphate.

Action and Uses.—Carbromal is a prompt, efficient and safe sedative, and its administration is largely free from unpleasant symptoms. As a hypnotic it is less efficient than barbituric acid derivatives, but it possesses the advantage of being less toxic. It is commonly **administered** in tablets or cachets, and should be given, followed by a hot drink, thirty minutes before bedtime.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

CARDAMOMUM
(Cardam.)
Cardamom

Synonyms—Cardamomi Semina; Cardamom Seeds.

Cardamom consists of the dried, ripe or nearly ripe seeds of *Elettaria Cardamomum* Maton var. *minuscula* Burkhill (Fam. Zingiberaceæ), a plant growing wild in the forests of Southern India and cultivated on the Malabar Coast and in Ceylon. The seeds are imported loose or in the capsules from which they are removed when required for use.

The fruit is an inferior, ovoid or oblong capsule about 1 to 2 centimetres long; it is plump or slightly shrunken, the larger fruits being somewhat three-sided; externally it is smooth or longitudinally striated,

and pale buff to pale greenish-buff in colour; the remains of the flower parts form a short beak at the apex, while the base is rounded or shows the remains of the stalk; there are three loculi, each with two rows of seeds attached to an axile placenta and forming an adherent mass. The seeds are pale to dark reddish-brown, about four millimetres long and three millimetres broad, irregularly angular, hard, transversely rugose, the raphe lying in a longitudinal groove; each seed is enveloped by a thin, colourless, membranous aril. When cut transversely, the seed shows a thin, dark seed coat, a whitish perisperm grooved on one side and, in the centre, a yellowish, translucent endosperm, surrounding a small embryo. The odour and taste are agreeable and strongly aromatic.

The diagnostic **microscopical** characters are the polyhedral masses of adherent starch grains, individual grains being up to 4 microns in diameter; the presence of one to seven small prisms of calcium oxalate embedded in each starch mass; the layer of dark brown sclerenchyma, each cell being beaker-shaped, about 20 microns wide and 40 microns deep, with a small lumen nearly filled by a nodule of silica; the elongated cells of the outer epidermis; a few small spiral vessels and the absence of fibres, fibrous sclerenchyma and large vessels.

Cardamom **contains** a volatile oil, from about 3 to 8 per cent.; it also contains much starch. It yields to alcohol (45 per cent.) about 7 per cent. of extractive.

Varieties.—Mysore cardamom fruits form the bulk of the imports; they are ovoid in shape, vary from 10 to 20 millimetres in length, and have a pale cream, nearly smooth, surface. Malabar fruits are smaller, shorter and plumper, and often not so smooth as the foregoing. Mangalore fruits closely resemble Malabar fruits, but are usually almost globular, rather larger and often have a roughish, almost scurfy coat.

Substitutes.—Ceylon fruits, wild or native, derived from *E. Cardamomum* var. *major* Thwaites, are a regular article of commerce and are readily distinguished by their elongated shape, shrivelled appearance and rather dark greyish-brown colour.

Standard, B.P.—Cardamom is separated from the fruits when required for use. It contains not more than 3 per cent. of foreign organic matter. Ash, not more than 6 per cent.

Cardamom, in powder (Pulvis Cardamomi : Pulv. Cardam.), contains the constituents and possesses the diagnostic microscopical characters of Cardamomum, and complies with the limit for ash of the unground drug.

Action and Uses.—Cardamom, on account of its carminative properties, is administered with purgatives, as in Extractum Colocynthidis Compositum, and with other aromatics, as in Pulvis Cinnamomi Compositus and Pulvis Cretæ Aromaticus. Tinctura Cardamomi Composita is the most commonly used cordial and flavouring agent. Together with cinnamon, clove, caraway and ginger, cardamom is also contained in Tinctura Cardamomi Aromatica, a more aromatic preparation than the compound tincture of cardamom.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

Preparations

Tinctura Cardamomi Aromatica, B.P.C.—(Tinct. Cardam. Aromat.)—Aromatic Tincture of Cardamom. *Syn.*—Tinctura Carminativa; Carminative Tincture. Cardamom, about 1 in 16, with strong tincture of ginger and oils of caraway, cinnamon and clove. Dose.– 0·12 to 0·6 millilitre (2 to 10 minims).

Tinctura Cardamomi Composita, B.P.—(Tinct. Cardam. Co.)—Compound Tincture of Cardamom. Cardamom, 1·4 per cent. w/v, with caraway, cinnamon, cochineal and glycerin, prepared by percolation with alcohol (60 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

CARMINUM
(Carmin.)

Carmine

Carmine is the aluminium lake of the colouring principle of cochineal and may be prepared by precipitating an aqueous infusion with alum. It occurs in light, bright red pieces, which can readily be reduced to powder. Carmine contains about 50 per cent. of carminic acid. On heating, it gives an odour of burnt feathers. It should be **stored** in well-stoppered, amber-coloured bottles.

Insoluble in water and dilute acids; readily soluble in solution of ammonia and alkaline liquids, forming a dark purplish-red solution.

Standard.—Carmine yields not more than 10 per cent. of ash, calculated on the substance dried at 100°. Loss on drying at 100°, not more than 15 per cent. 0·1 gramme added to 1 millilitre of solution of ammonia and diluted to 100 millilitres with water forms a clear solution (limit of insoluble matter).

Uses.—Carmine is used to colour ointments, tooth powders, tooth washes, dusting powders and other similar preparations. If used in solid form, prolonged trituration with powder is necessary to obtain a good colour and even distribution. To obtain the maximum of colour the carmine should be dissolved in a small quantity of strong solution of ammonia and triturated with the powder. A good solution for colouring neutral or alkaline mouth-washes and mixtures is Liquor Carmini, an ammoniacal aqueous solution, of which 3 or 4 drops to a fluid ounce of liquid is sufficient. The colouring matter of Liquor Carmini is precipitated in acid solutions. Carmine is used for staining histological specimens. Since it passes through the stomach unchanged, it is also used to indicate the rate of passage of intestinal contents.

Preparations

Glycerinum Carmini, B.P.C.—(Glycer. Carmin.)—Glycerin of Carmine. Carmine, 1 in 16, with potassium carbonate and potassium citrate in glycerin and distilled water.

Liquor Carmini, B.P.C.—(Liq. Carmin.)—Solution of Carmine. Carmine, 6 per cent. w/v, with dilute solution of ammonia and potassium citrate in glycerin and distilled water.

CARUM
(Carum)
Caraway

Synonyms—Carui Fructus; Caraway Fruit; Caraway Seed.

Caraway consists of the dried, ripe fruits of *Carum Carvi* Linn. (Fam. Umbelliferæ), an erect biennial herb indigenous to and cultivated in Central and Northern Europe, chiefly in Holland. The plant is cut when the fruit is ripe, and the fruits obtained by threshing.

The fruit is an elongated cremocarp, but the two mericarps are usually separate and detached from the pedicel. Each mericarp is up to about 7 millimetres in length and 2 millimetres in breadth, slightly curved and tapering towards each end; the surface is glabrous and brown and is traversed longitudinally by five narrow, yellowish, primary ridges; in the tissue between the ridges are six vittæ, four on the dorsal surface and two on the commissure. The pericarp is thin and the large oily endosperm is not grooved on the commissure. The drug has a characteristic aromatic odour and taste.

The diagnostic **microscopical** characters are the thick-walled epidermal cells with striated cuticle; the small vessels, pitted sclerenchyma and fibres of the vascular tissue; the somewhat thick-walled parenchymatous cells of the endosperm, containing fixed oil, aleurone grains up to 10 microns in diameter and microsphæroidal crystals of calcium oxalate; the absence of lignified and reticulate parenchyma.

Caraway **contains** 3·5 to 6 per cent. of volatile oil, containing about 50 per cent. of carvone; it also contains fatty oil. It yields to cold water from 20 to 26 per cent. of non-volatile extractive.

Substitutes and Adulterants.—Fruits from which the volatile oil has been partially removed are sometimes offered; they may be recognised by their dark colour, shrivelled appearance, want of aroma and low yield of aqueous extractive (less than 15 per cent.)

Standard, B.P.—Caraway contains not more than 2 per cent. of foreign organic matter. Ash, not more than 9 per cent. Acid-insoluble ash, not more than 1·5 per cent.

Caraway, in powder (Pulvis Cari : Pulv. Cari), contains the constituents and possesses the diagnostic microscopical characters of Carum, and complies with the limits for ash and acid-insoluble ash of the unground drug.

Action and Uses.—Caraway is a carminative. Caraway water is a useful remedy in the flatulent colic of infants and an excellent vehicle for children's medicines.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

Preparations

Aqua Cari Concentrata, B.P.C.—(Aq. Cari Conc.)—Concentrated Caraway Water. Oil of caraway, 1 in 50. One part added to 39 parts of distilled water yields a preparation which is approximately equivalent in strength to distilled caraway water, but contains 1·5 per cent. v/v of alcohol (90 per cent.). Dose– 0·3 to 1 millilitre (5 to 15 minims).

Aqua Cari Destillata, B.P.C.—(Aq. Cari Dest.)—Distilled Caraway Water. Caraway, 1 in 10. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This water was included in the British Pharmacopœia, 1914, under the name of Aqua Carui.

CARYOPHYLLUM
(Caryoph.)

Clove

Synonyms—Caryophyllus; Cloves.

Clove consists of the dried flower-buds of *Eugenia aromatica* (Linn.) Baill. (Fam. Myrtaceæ), an evergreen tree indigenous to and formerly cultivated in the Molucca Islands, but now cultivated chiefly in Zanzibar and Pemba. The flower-buds are white when young, becoming green and then crimson during ripening. They are then collected and dried in the sun.

The flower-bud is from 10 to 17·5 millimetres long, of a reddish-brown colour and heavier than water. The lower portion consists of a slightly flattened four-sided hypanthium, which exudes oil when pressed with the finger-nail and contains, in its upper part, two loculi in which are numerous ovules on axile placentæ. The hypanthium is crowned by four thick, acute, divergent sepals within which is a dome-shaped head consisting of four paler, unexpanded, membranous, imbricate petals enclosing numerous incurved stamens and a single, stiff, erect style. The drug has a strong, aromatic, spicy odour and a pungent taste.

The diagnostic **microscopical** characters are the epidermis of the hypanthium and calyx teeth composed of straight-walled cells and showing large stomata; the tetrahedral pollen grains, 15 to 20 microns in diameter; the fibrous layer of the anther walls; the schizo-lysigenous glands found in all parts of the clove; occasional isolated pericyclic fibres; the spongy tissue of the hypanthium; the cluster-crystals of calcium oxalate, varying from 6 to 20 microns in diameter; the absence of stone cells, starch and prismatic crystals of calcium oxalate.

Clove **contains** from 15 to 20 per cent. of volatile oil, of which about 85 to 92 per cent. consists of eugenol. The drug also contains gallotannic acid (13 per cent.), fatty oil, resin and a crystalline body, caryophyllin, which, however, is odourless and appears to be a phytosterol.

Varieties.—The bulk of the supplies of clove come from Zanzibar, but Penang, Amboyna and Madagascar cloves command higher prices. Penang clove is larger, more plump, and bright reddish-brown in colour. Amboyna clove is similar but smaller, while Zanzibar clove is smaller still, darker in colour and less fragrant.

Substitutes and Adulterants.—"Blown" cloves are the expanded flowers from which the petals and stamens have been removed. Clove "dust" often consists largely of broken stamens, petals, etc. Clove stalks are up to about 3·5 centimetres in length and 3 millimetres in thickness and branch trichotomously; they are brownish and woody and break with a short fracture; they contain about 5 to 7 per cent. of volatile oil, which is less aromatic and somewhat different from that of clove. Clove stalks

are said to be used for adulterating powdered cloves, in which their presence is easily detected by means of the isodiametric sclerenchymatous cells and by the higher proportion of ash and the prismatic crystals of calcium oxalate. The nearly ripe fruits are also exported under the name "mother cloves" (anthophylli); they contain very little volatile oil and their presence may be detected by the large starch grains which the seeds contain. Exhausted clove, from which the oil has been removed by distillation, yields no oil when indented with the finger-nail and floats when placed on water.

Standard, B.P.—Clove contains not more than 5 per cent. of its stalks and not more than 1 per cent. of foreign organic matter. Ash, not more than 10 per cent. Acid-insoluble ash, not more than 0·75 per cent. It complies also with tests for limit of stalks and for absence of clove fruits and cereals.

Clove, in powder (Pulvis Caryophylli : Pulv. Caryoph.), contains the constituents and possesses the diagnostic microscopical characters of Caryophyllum, and complies with the limits for ash, acid-insoluble ash, stalks, clove fruits and cereals of the unground drug.

Action and Uses.—Clove is stimulating and carminative to the alimentary canal; it is used in flatulence, dyspepsia and as an adjuvant to other medicines. Fresh infusion of clove contains the astringent matter as well as some of the volatile oil; the infusion and water are useful vehicles for alkalis and aromatics.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

Preparations

Aqua Caryophylli Concentrata, B.P.C.—(Aq. Caryoph. Conc.)—Concentrated Clove Water. Oil of clove, 1 in 50. One part added to 39 parts of distilled water yields a preparation which is approximately equivalent in strength to distilled clove water, but contains 1·5 per cent. v/v of alcohol (90 per cent.). Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Aqua Caryophylli Destillata, B.P.C.—(Aq. Caryoph. Dest.)—Distilled Clove Water. Clove, 1 in 40. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Infusum Caryophylli Concentratum, B.P.—(Inf. Caryoph. Conc.)—Concentrated Infusion of Clove. Clove, about 1 in 5, extracted with alcohol (25 per cent.). This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of clove and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

A concentrated infusion prepared with alcohol (20 *per cent.*) *was included in the British Pharmaceutical Codex*, 1923.

Infusum Caryophylli Recens, B.P.—(Inf. Caryoph. Rec.)—Fresh Infusion of Clove. 1 in 40. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

CASCARA SAGRADA

(Casc. Sagr.)

Cascara Sagrada

Synonym—Sacred Bark.

Cascara sagrada is the dried bark of *Rhamnus Purshiana* DC. (Fam. Rhamnaceæ), a shrub growing in North California, Oregon,

Washington and British Columbia. It is collected in the spring and early summer and dried, the collection being made at least one year before the bark is used.

The bark occurs in quilled, channelled or nearly flat pieces from 1 to 4 millimetres thick, varying in length up to about 10 or 20 centimetres and in breadth up to about 2 centimetres. The outer surface is nearly smooth, the cork being dark purplish-brown in colour and bearing scattered lenticels; it is usually more or less completely covered by a whitish coat of lichens. The inner surface is yellow to reddish-brown or nearly black, with longitudinal striations and faint transverse corrugations. The fracture is short and somewhat fibrous near the inner surface. The smoothed, transverse section exhibits a narrow, purplish cork, a yellowish-grey cortex, in which are darker, translucent groups of sclerenchymatous cells, and a brownish-yellow phloem traversed by slightly wavy medullary rays. The bark has a characteristic odour and a nauseous and persistently bitter taste.

The diagnostic **microscopical** characters are the groups of sclerenchymatous cells in both cortex and phloem; the bundles of slender phloem fibres, accompanied by crystal-sheaths with prisms of calcium oxalate; the cluster-crystals of calcium oxalate scattered throughout the parenchyma, the cells of which contain a yellow substance coloured violet by sodium hydroxide solution.

Cascara sagrada **contains** emodin and an isomeric substance, probably identical with the frangula-emodin of alder buckthorn bark. Fat (about 2 per cent.), dextrose and a hydrolytic enzyme have also been found in it, as well as a small quantity of a substance yielding, on treatment with acids, syringic acid. Neither chrysophanic acid nor chrysarobin is present. The total amount of hydroxymethylanthraquinones present in the bark, or extractable after boiling with dilute sulphuric acid, has been estimated to be from 1·4 to 4 per cent., but although these bodies are laxative, the principal purgative constituent of cascara sagrada is unknown. It yields to water from about 23 to 28 per cent. of extractive.

Substitutes and Adulterants.—The bark of *R. californica* Eschscholz is occasionally substituted for the official drug. It has a dull grey, slightly reddish cork, fewer lenticels and a uniform coat of lichens. The bark of *R. cathartica* Linn. is glossy, reddish-brown and has very distinct lenticels.

Standard, B.P.—Cascara sagrada contains not more than 2 per cent. of foreign organic matter. Ash, not more than 6 per cent.

Cascara sagrada, in powder (Pulvis Cascaræ Sagradæ : Pulv. Casc. Sagr.), contains the constituents and possesses the diagnostic microscopical characters of Cascara Sagrada, and complies with the limit for ash of the unground drug.

Action and Uses.—Cascara sagrada is a mild laxative acting principally on the large intestine. It is a useful laxative in hæmorrhoidal conditions. Small repeated doses after meals are more effective in chronic constipation than a large dose taken at night. It may be **administered** in the form of Extractum

Cascaræ Sagradæ Liquidum, preferably in a mixture with alkalis, especially Spiritus Ammoniæ Aromaticus, flavoured with Extractum Glycyrrhizæ Liquidum. Mistura Cascaræ Composita is a suitable mixture on these lines. On account of its unpleasant taste, cascara sagrada is often prescribed as Elixir Cascaræ Sagradæ or Syrupus Cascaræ Aromaticus, or as the liquid extract enclosed in capsules. Extractum Cascaræ Sagradæ Siccum is used in tablet form either alone or with extracts of nux vomica and belladonna, or with aloin, extract of euonymus, or strychnine.

Dose.– 1·2 to 4 grammes (20 to 60 grains).

Preparations

Elixir Cascaræ Sagradæ, B.P.—(Elix. Casc. Sagr.)—Elixir of Cascara Sagrada. An aqueous extract of cascara sagrada, 1 in 1, made less bitter with light magnesium oxide and flavoured with liquorice, soluble saccharin, oil of coriander, oil of anise, alcohol (90 per cent.) and glycerin. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Extractum Cascaræ Sagradæ Liquidum, B.P.—(Ext. Casc. Sagr. Liq.)—Liquid Extract of Cascara Sagrada. *Syn.*—Fluid Extract of Cascara Sagrada. 1 in 1. It is prepared with distilled water and preserved by the addition of alcohol (90 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Extractum Cascaræ Sagradæ Siccum, B.P.—(Ext. Casc. Sagr. Sicc.)—Dry Extract of Cascara Sagrada. The aqueous percolate evaporated to dryness under reduced pressure and granulated. It should be stored in small, wide-mouthed, well-closed containers in a cool place. Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

Mistura Cascaræ Composita, B.P.C.—(Mist. Casc. Co.)—Compound Mixture of Cascara. Each fluid ounce contains 20 minims of liquid extract of cascara sagrada, 5 minims each of the tinctures of belladonna and nux vomica, with liquid extract of liquorice, aromatic spirit of ammonia, glycerin and chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Mistura Rhei et Cascaræ, B.P.C.—(Mist. Rhei et Casc.)—Rhubarb and Cascara Mixture. Each fluid ounce contains 4 grains of rhubarb, 12 grains of sodium bicarbonate and 20 minims of liquid extract of cascara sagrada, with liquid extract of liquorice, syrup of ginger, oil of peppermint and chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Pilulæ Cascaræ Compositæ, B.P.C.—(Pil. Casc. Co.)—Compound Cascara Pills. *Syn.*— Pilulæ Cascaræ, Belladonnæ et Nucis Vomicæ. Each pill contains ⅓ grain of dry extract of cascara, and $\frac{1}{10}$ grain each of the dry extracts of belladonna and nux vomica. Dose.– 1 to 3 pills.

Syrupus Cascaræ Aromaticus, B.P.C.—(Syr. Casc. Aromat.)—Aromatic Syrup of Cascara. Liquid extract of cascara, 1 in 2½, with tincture of orange, alcohol (90 per cent.), cinnamon water and syrup. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

This syrup was included in the British Pharmacopœia, 1914.

CASCARILLA

(Cascaril.)

Cascarilla

Synonym—Cascarilla Bark.

Cascarilla is the dried bark of *Croton Eluteria* Benn. (Fam. Euphorbiaceæ), a small tree indigenous to the Bahama Islands.

The bark occurs usually in single quills or channelled pieces varying from about 2·5 to 7·5 centimetres in length and from 4 to 12 millimetres in width. The outer surface of the cork is chalky in appearance and frequently bears the minute, black fructifications of ascolichens; it is longitudinally wrinkled, chequered in places due to small transverse and longitudinal cracks, and the cork easily exfoliates, revealing a brown or grey-brown cortex marked with corresponding fissures. The inner surface is longitudinally striated and dark brown in colour; the fracture is short and resinous. The smoothed transverse surface exhibits a narrow, pale yellowish-brown layer of cork, a light brown cortex and a dark brown phloem with irregular, angular projections towards the cortex and with numerous, thin, whitish lines of the medullary rays. The odour is pleasant and aromatic and the taste is bitter.

The diagnostic **microscopical** characters are the cork cells, polygonal in surface view, lignified, and showing a much thickened, stratified, outer wall and a thin inner one in which are embedded numerous small, prismatic crystals of calcium oxalate; the parenchyma of phelloderm, cortex and phloem containing either prismatic or cluster-crystals of calcium oxalate, starch grains, or droplets of oleo-resin; the phloem containing also secretion cells and fibres which are isolated or in small groups, the medullary rays which are one or two cells wide; the absence of stone cells.

Cascarilla **contains** about 1·5 to 2 per cent. of volatile oil [specific gravity, 0·904 to 0·931; optical rotation, +8·2° to −0·5° (100 mm. tube); refractive index at 20°, 1·488 to 1·498], the crystalline bitter principle, cascarillin, and betaine. The drug yields to 70 per cent. alcohol from 12 to 18 per cent. of extractive. Powdered cascarilla contains a smaller proportion of volatile oil than the unground drug.

Standard.—Cascarilla contains not more than 2 per cent. of foreign organic matter. Ash, not more than 11 per cent.

Cascarilla, in powder (Pulvis Cascarillæ: Pulv. Cascaril.), contains the constituents and possesses the diagnostic microscopical characters of Cascarilla, and complies with the limit for ash of the unground drug.

Action and Uses.—Cascarilla is an aromatic bitter and also possesses weak febrifugal properties. It is most frequently **administered** in the form of infusion or tincture. Tincture of cascarilla is an ingredient of bitter tonics, frequently with mineral acids. Cascarilla is also used in fumigating compounds on account of its aromatic odour while burning.

Preparations

Infusum Cascarillæ Concentratum, B.P.C.—(Inf. Cascaril. Conc.)—Concentrated Infusion of Cascarilla. About 1 in 2½. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of cascarilla and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Infusum Cascarillæ Recens, B.P.C.—(Inf. Cascaril. Rec.)—Fresh Infusion of Cascarilla. 1 in 20. When infusion of cascarilla or Infusum Cascarillæ is prescribed, fresh infusion not being specified, either Infusum Cascarillæ Recens, or Infusum Cascarillæ Concentratum suitably diluted, may be dispensed Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This infusion was included in the British Pharmacopœia, 1914, *under the name of Infusum Cascarillæ.*

Tinctura Cascarillæ, B.P.C.—(Tinct. Cascaril.)—Tincture of Cascarilla. 1 in 5. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

CASEINUM SOLUBILE

(Casein. Solub.)

Soluble Casein

Soluble casein is a compound of casein with a small proportion of alkali. It may be prepared by mixing precipitated casein, while still moist, with powdered sodium carbonate, the product being dried at a low temperature. It occurs as a white or yellowish-white, non-hygroscopic, almost odourless powder, with a characteristic taste. Casein is a protein occurring in milk and may be prepared from skimmed milk by the addition of acid or by the action of rennet. The protein clot is separated from the whey, washed, and dried at a low temperature. Casein is a phosphoprotein and a weak dibasic acid, forming acid or neutral salts with alkalis. It contains about 15 per cent. of nitrogen, about 0·9 per cent. of phosphorus and about 0·8 per cent. of sulphur. Casein as it exists in milk (sometimes termed caseinogen), or as prepared by the action of rennet, contains calcium. It is hardened to a horn-like consistency by the action of formaldehyde. Various grades are prepared for technical purposes, with or without the addition of alkalis or borax to increase the solubility.

Almost entirely **soluble** in water.

Standard.—Soluble casein, determined by the Kjeldahl method, contains not less than 12 per cent. of N, calculated on the substance dried at 100°. Loss on drying at 100°, not more than 10 per cent. Ash, not more than 5 per cent. The ash, dissolved in water and slightly acidified with hydrochloric acid, does not cause turmeric paper dipped in the solution to assume a red or brownish-red colour on drying (absence of borax). 3 grammes stirred with 20 millilitres of water at 30° forms a smooth mucilaginous solution within fifteen minutes. When 1 gramme is dissolved in 20 millilitres of water and the casein is precipitated with a slight excess of hydrochloric acid, the filtrate, after neutralisation with sodium hydroxide solution, gives not more than a trace of red precipitate on boiling with 5 millilitres of Fehling's solution (limit of lactose).

Action and Uses.—Casein or soluble casein is the chief constituent of various nutritive preparations, sometimes mixed with ovolecithin or with the glycerophosphates of sodium, calcium, magnesium and iron,

and is also a constituent of many diabetic and protein foods. Soluble casein has the advantage of being more readily miscible with water than ordinary casein and is more easily digested. Casein is sometimes employed as a basis of non-greasy skin-creams, these usually being prepared with an alkali carbonate and mucilage of tragacanth or quince, and containing zinc oxide or other suitable medicament. Pure casein, dissolved with the aid of hydrochloric acid or 0·1 per cent. w/v solution of sodium hydroxide, is employed for determining the activity of peptic and tryptic ferments.

Casein is used largely in many industries; it is an ingredient of paste and dry distempers, glues and sizes. Insoluble casein, treated with formaldehyde and subjected to heavy pressure, gives a very hard material which by addition of various pigments gives imitations of bone, ivory, ebonite and other similar substances. Casein is generally the only source of protein in the vitamin A–free diet of rats used for testing for vitamin A. The sample used must therefore be a perfect protein; that is, it must contain all the amino-acids which have been shown to be necessary for growth. It should be tested by a special experiment; rats should be given this diet supplemented liberally with the lacking vitamin; if growth is not normal, the casein must be considered inadequate. It should also be free from detectable traces of vitamin A, although for tests of vitamin A the presence of vitamin B in the casein is immaterial. On the other hand, when casein is the source of protein in diets used for vitamin B tests, it should be free from this vitamin, but not necessarily free from vitamin A. Soluble casein is **incompatible** with acids.

Preparation

Caseinum Glycerophosphaticum, B.P.C.—(Casein. Glycerophosph.)—Glycerophosphated Casein. Soluble casein, with sodium and calcium glycerophosphates, of each, 1 in 40. Dose.–4 to 16 grammes (1 to 4 drachms).

CASSIÆ CORTEX

(Cass. Cort.)

Cassia Bark

Synonym—Chinese Cinnamon.

Cassia bark is obtained from *Cinnamomum Cassia* Blume (Fam. Lauraceæ), an evergreen tree indigenous to Cochin China and the South of China, but cultivated also in other parts of Eastern Asia.

The bark occurs in single quills or channelled pieces from 5 to 40 centimetres long, 12 to 18 millimetres in diameter, and 1 to 3 millimetres thick. The colour is dark earthy-brown, except where patches of thin, greyish cork persist. The fracture is short and granular in the outer part, but slightly fibrous in the inner part. The smoothed transverse surface of thicker pieces shows a pale zone of pericyclic stone cells at varying depths from the outer surface, and to the inside a brown

phloem traversed by thin, paler medullary rays. The transverse section is characterised by an interrupted ring of sclereides, many cells of which have walls more thickened on three sides, the cells of the medullary rays, many of which contain short needle crystals of calcium oxalate, isolated or grouped sclerenchymatous fibres mostly from 30 to 40 microns wide, and secretion-cells. Starch grains are abundant, mostly over 10 microns in diameter. The odour is like that of cinnamon, but less delicate, and the taste more mucilaginous and astringent.

Cassia bark **contains** from 1 to 2 per cent. of volatile oil. It also contains tannin, sugar and mucilage.

Action and Uses.—Cassia bark has properties similar to those of cinnamon; it is mildly astringent, carminative and antiseptic. Oil of cassia is used as a substitute for oil of cinnamon, which it closely resembles in its medicinal properties.

CASSIÆ FLOS.—Cassia bud consists of the immature fruits of species of *Cinnamomum*, probably *C. Cassia* Blume and *C. Loureirii* Nees, the so-called buds being shipped from Canton. Cassia buds are about 6 to 10 millimetres long and 5 millimetres in diameter at the widest point; each consists of a short stalk, about 1 to 2 millimetres long, supporting a small, vertically flattened fruit which is almost completely enclosed by the six persistent, incurved, rounded perianth parts arranged in two whorls of three and united below to form a stalk-like portion about 3 millimetres long. They are hard, brown or greyish, woody and wrinkled; the odour and taste resemble those of cinnamon. Cassia bud contains about 1·6 per cent. of volatile oil, consisting principally of cinnamic aldehyde. It is used as a spice and for the same purposes as cinnamon.

CASSIÆ FRUCTUS

(Cass. Fruct.)

Cassia Fruit

Synonym—Cassia Pod.

Cassia fruit consists of the ripe fruits of *Cassia Fistula* Linn. (Fam. Leguminosæ), a tree indigenous to India.

The fruit is a many-celled, indehiscent pod, from 35 to 50 centimetres long and from 18 to 25 millimetres in diameter, nearly straight and subcylindrical in shape and dark chocolate-brown to almost black in colour. The surface of the pod appears smooth to the naked eye, but is seen under the lens to be marked with minute transverse fissures. Both dorsal and ventral sutures are evident, but not prominent. A short stalk is attached to the base of the fruit, and the rounded distal end is mucronate. The pericarp is thin, hard and woody. The interior of the fruit is divided by transverse dissepiments, about 6 millimetres apart, into compartments, each of which contains a single seed attached to the ventral suture by a long, dark, thread-like funicle. The seeds are about 8 by 10 by 2·5 millimetres, ovoid and flattened in shape, of a shining reddish-brown colour, smooth and extremely hard; they are embedded in a black, viscid pulp which at first fills the cell, but, on drying, shrinks and is found adhering to both sides of the dissepiments,

the seeds being then often loose in their cells. The pulp has a sweetish taste and a faint sickly odour.

Cassia fruit **contains** mucilage, pectin, hydroxymethylanthraquinones and a large proportion of sugar.

Substitutes.—The fruit of *Cassia grandis* Linn. (horse cassia), from Brazil and Central America, is usually longer, thicker and heavier than that of *C. Fistula.* The surface is rough and the fruit laterally compressed, being elliptical in cross section. It has one prominent ridge on the dorsal and two on the ventral suture. The fruit of *C. moschata* H B. & K., from New Granada, is smaller and narrower than that of *C. Fistula.* The pulp is paler in colour and has a musky odour when warmed.

Standard.—Cassia fruit yields to water not less than 30 per cent. of extractive.

Action and Uses.—The aqueous extract, known as cassia or cassia pulp, is laxative and is an ingredient of confection of senna; it is rarely used alone.

Preparation

Cassia, B.P.—(Cass.)—Cassia. *Syn.*—Cassiæ Pulpa; Cassia Pulp. The pulp of cassia fruit extracted by percolation with water and evaporation of the percolate to the consistence of a soft extract. Dose.– 4 to 8 grammes (1 to 2 drachms).

CASTOREUM
(Castor.)
Castor

Castor consists of the dried follicles obtained from the beaver, *Castor fiber* Linn. (Order, Rodentia; Class, Mammalia), found chiefly in the Hudson Bay Territory. The follicles are situated between the anus and external genitals of both sexes of the animal, where two pairs of membranous sacs occur, the anterior and larger pair constituting the drug, the remaining pair being the anal glands. The follicles are either dried in the sun or smoked.

The drug occurs in dark brownish or greyish, pear-shaped masses, about 8 to 10 centimetres long, usually in pairs, connected by a portion of the preputial or vaginal canal. The follicles are firm, heavy and solid, and are divided internally into numerous cells, which contain a brown or reddish-brown, resinous secretion which when fresh, is soft and pale in colour, becoming hard and dark with age. The odour is empyreumatic and somewhat disagreeable. When examined microscopically, spherical grains of crystalline calcium carbonate are to be found in the resinous mass. Russian castor is larger, fuller and heavier than the North American variety; the contents have a stronger and more agreeable odour. Adulteration has been effected by emptying the sacs and filling with brown wood fibre, dried blood, resin, etc.

Castor **contains** from 35 to 70 per cent. of resinous matter soluble in alcohol, about 8 per cent. of ether-soluble fatty matter and a variable amount of moisture. The odour is due to the presence of a volatile oil.

Action and Uses.—Castor had a reputation formerly for the treatment of dysmenorrhœa and hysterical conditions. It is **administered** principally as Tinctura Castorei, which may be given in mixture form with a little mucilage to suspend the resin and with tincture or infusion of valerian.

Preparation

Tinctura Castorei, B.P.C.—(Tinct. Castor.)—Tincture of Castor. 1 in 20. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

CATECHU

(Catech.)

Catechu

Synonyms—Pale Catechu; Gambir.

Catechu is a dried aqueous extract prepared from the leaves and young shoots of *Uncaria Gambier* (Hunter) Roxb. (Fam. Rubiaceæ), a climbing shrub indigenous to and cultivated in the Malay Archipelago. The leaves and young shoots are boiled with water, and the decoction evaporated to a thick syrup and cooled, crystallisation being promoted by stirring; the product is poured into shallow, wooden trays, allowed to set, cut up into cubes and dried.

The extract occurs in cubes, which are sometimes more or less agglutinated and mixed with fragments of broken cubes; they are friable and porous, and measure about 25 millimetres in each direction. Their colour is dull, pale greyish-brown to dark reddish-brown externally and pale brown internally. Examined microscopically, catechu is seen to consist chiefly of minute acicular crystals. Catechu may be distinguished from black catechu by the following tests:—Mix 2 millilitres of a filtered and cooled 15 per cent. solution in warm alcohol with an equal volume of sodium hydroxide solution, shake with 2 millilitres of light petroleum and allow to separate; the light petroleum layer exhibits a brilliant greenish fluorescence. Warm catechu with chloroform and filter; a yellowish-green solution is produced.

Catechu **contains** catechin (7 to 33 per cent.), and catechutannic acid (22 to 50 per cent.). In addition to these, quercetin, wax, oil, catechu-red and a fluorescent body, named gambier-fluorescein, occur in small quantities. The drug also contains vegetable debris and mineral matter (about 3 to 5 per cent.). Catechin, $C_{15}H_{14}O_6,4H_2O$, which is not identical with the acacatechin of cutch, occurs in white, silky needles melting at 96°; the monohydrate, obtained by drying over sulphuric acid, melts at 176° to 177°, and this is also the melting-point of the anhydrous substance. There is also present a small amount of catechin-c, which is anhydrous and melts at 235° to 237°. Catechin is sparingly soluble in cold water (1 in 1100 to 1200), but freely soluble in boiling water and alcohol, and produces with ferric salts a deep green colour. Catechu tannic acid is a reddish, amorphous, astringent substance,

which precipitates gelatin and is coloured dirty green by ferric salts. On boiling the aqueous solution, with or without a mineral acid, it is converted into a reddish-brown, amorphous substance.

Standard, B.P.—Catechu yields not more than 25 per cent. of water-insoluble matter, dried at 100°. Loss on drying at 100°, not more than 10 per cent. Alcohol-insoluble matter, dried at 100°, not more than 30 per cent.; the alcohol-insoluble matter contains not more than an occasional starch grain. Ash, not more than 8 per cent. It complies with a test with solution of calcium hydroxide.

Catechu, in powder (Pulvis Catechu : Pulv. Catech.), contains the constituents and possesses the diagnostic microscopical characters of Catechu, and complies with the standard for the unground drug.

Action and Uses.—Catechu is a powerful astringent. It is used internally, in association with other astringents as Pulvis Catechu Compositus and as Tinctura Catechu, in diarrhœa and hæmorrhage from the alimentary canal. The compound powder may be administered in cachets, or in mixtures with sedatives; the tincture is generally used in conjunction with chalk, opium, or ginger. Catechu lozenges are used for their astringent action in the mouth and throat, and the tincture, diluted 1 in 25, may be used as a gargle. Preparations of catechu are **incompatible** with gelatin, iron salts and alkalis.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Pulvis Catechu Compositus, B.P.C.—(Pulv. Catech. Co.)—Compound Powder of Catechu. Catechu, 1 in 2½, with kino, krameria, cinnamon and nutmeg. Dose.– 0·6 to 4 grammes (10 to 60 grains).

This powder was included in the British Pharmacopœia, 1914.

Tinctura Catechu, B.P.—(Tinct. Catech.)—Tincture of Catechu. Catechu, 1 in 5, with cinnamon, prepared by maceration with alcohol (45 per cent.) Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Trochisci Catechu, B.P.C.—(Troch. Catech.)—Catechu Lozenges. Each lozenge contains 1 grain of catechu.

This lozenge, containing 0·06 *gramme of catechu, was included in the British Pharmacopœia*, 1914.

CATECHU NIGRUM

(Catech. Nig.)

Black Catechu

Synonyms—Cutch; Kutch.

Black catechu is an extract prepared from the heartwood of *Acacia Catechu* Willd. (Fam. Leguminosæ), a moderate-sized tree indigenous to Eastern India and Burma. After felling, the bark and sapwood are stripped from the trunk and the dark red heartwood cut into chips and boiled in water in earthen pots; the decoction is strained and

boiled down, with continued stirring, to a syrupy consistence. When sufficiently cool, the syrup is poured into wooden moulds lined with leaves or paper, and left to harden. The resulting solid extract forms large, brick-like masses which are broken up into pieces of irregular shape.

The extract occurs in irregular, dark brown to almost black masses, externally rough and dull or, rarely, glossy, frequently having pieces of brownish-buff leaves attached to them. It is hard and brittle, but frequently soft internally. The fractured surface is dark brown with a dull gloss, and porous. The drug is odourless, and the taste at first bitter, becoming sweetish and astringent. It is partially soluble in water, yielding a brown magma which, when examined microscopically, exhibits numerous minute crystals. It is almost entirely soluble in boiling water, the solution on cooling giving a crystalline sediment. A 1 per cent. aqueous solution gives a dark green colour with 0·1 per cent. w/v ferric chloride solution, changing to purple when made slightly alkaline with 5 per cent. sodium hydroxide solution. It does not respond to the test for gambier fluorescein described under catechu.

Black catechu **contains** catechutannic acid (25 to 35 per cent.), acacatechin (2 to 10 per cent.), quercetin, and catechu red.

Substitutes.—Mangrove cutch is a similar extract and is made from the bark of *Rhizophora Mangle* Linn., and of *Ceriops Candolleana* Arn. (Fam Rhizophoraceæ).

Standard.—Black catechu yields to alcohol (90 per cent.) not less than 60 per cent. of extractive. Ash, not more than 8 per cent.

Black catechu, in powder (Pulvis Catechu Nigri : Pulv. Catech. Nig.), contains the constituents and possesses the diagnostic microscopical characters of Catechu Nigrum, and complies with the standard for the unground drug.

Action and Uses.—Black catechu resembles pale catechu in its properties and is employed for similar purposes.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

CAULOPHYLLUM

(Cauloph.)

Caulophyllum

Synonyms— Blue Cohosh; Caulophyllum Rhizome; Papoose Root; Squaw Root.

Caulophyllum consists of the rhizome and roots of *Caulophyllum thalictroides* (Linn.) Mich. (Fam. Berberidaceæ), a herbaceous plant growing in the United States.

The rhizome is horizontal, greyish-brown, about 5 to 20 centimetres long and 5 to 12 millimetres thick, irregular, somewhat tortuous and

branched, and bears encircling scale-leaf scars. The upper surface bears cup-shaped depressions and remains of aerial stems. The numerous, wiry, nearly cylindrical, smooth, matted roots arise from all parts of the surface, and are about 10 centimetres long and 1 to 3 millimetres in diameter. The transversely cut surface of the rhizome is brownish-grey and horny, with a thin bark and a ring of numerous narrow wedges of wood surrounding a large pith. Starch is present in the broad medullary rays and in the pith. The fracture is short. Caulophyllum is odourless, but sternutatory, and the taste is bitter and acrid.

Caulophyllum **contains** two saponins, leontin (caulosaponin) and caulophyllosaponin, the alkaloid, methylcytisine (caulophylline), and resin. The alkaloid must not be confused with the brown resinous powder, caulophyllin, which is obtained by precipitation from a concentrated alcoholic tincture of the drug. It yields to alcohol (70 per cent.) about 25 per cent. of extractive.

Standard.—Caulophyllum contains not more than 3 per cent. of foreign organic matter. Acid-insoluble ash, not more than 4 per cent.

Action and Uses.—Caulophyllum is used as a diuretic and emmenagogue, and is stated to exert a direct influence on the uterus. It has been used with success as an anthelmintic. It is usually **administered** as Extractum Caulophylli Liquidum and frequently with pulsatilla, or pulsatilla with aletris and black haw, as Liquor Caulophylli et Pulsatillæ or Liquor Caulophylli et Pulsatillæ Compositus.

Dose.– 0·3 to 2 grammes (5 to 30 grains).

Preparations

Extractum Caulophylli Liquidum, B.P.C.—(Ext. Cauloph. Liq.)—Liquid Extract of Caulophyllum. *Syn.*—Liquid Extract of Blue Cohosh. 1 in 1. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Liquor Caulophylli et Pulsatillæ, B.P.C.— (Liq. Cauloph. et Pulsat.)—Solution of Caulophyllum and Pulsatilla. Liquid extract of caulophyllum, 1 in 4, and liquid extract of pulsatilla, 1 in 20, with glycerin and alcohol (60 per cent.). Dose – 4 to 8 millilitres (1 to 2 fluid drachms).

Liquor Caulophylli et Pulsatillæ Compositus, B.P.C.—(Liq. Cauloph. et Pulsat. Co.)—Compound Solution of Caulophyllum and Pulsatilla. Liquid extracts of caulophyllum, about 1 in 6, pulsatilla, 1 in 20, aletris, 1 in 10, and black haw, 1 in 5, with glycerin and alcohol (60 per cent.). Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

CERA ALBA
(Cera Alb.)
White Beeswax

White beeswax is obtained by bleaching yellow beeswax. The bleaching may be effected by exposing the wax in thin layers to the

action of air, sunlight and moisture, but is more usually accomplished by treatment with chemicals such as potassium dichromate and sulphuric acid. It occurs as hard, yellowish-white masses, translucent in thin layers, with a faint characteristic odour.

Standard, B.P.—White beeswax has an acid value of 18 to 24. In other respects it complies with the standard for Cera Flava.

Uses.—White beeswax is used in the preparation of emollient ointments, and occasionally to raise the melting-point of suppositories. Aseptic wax is used to arrest hæmorrhage in cranial surgery.

Preparations

Cera Aseptica, B.P.C.—(Cera Asep.)—Aseptic Wax. Salicylic acid, approximately 1 per cent., in a sterilised mixture of almond oil and white beeswax.

Unguentum Aquosum, B.P.—(Ung. Aquos.)—Hydrous Ointment. Distilled water, about 25 per cent., and borax, 1 per cent., in white beeswax, white soft paraffin and olive oil.

CERA FLAVA
(Cera Flav.)
Yellow Beeswax

Yellow beeswax is a secretion formed by the hive bee, *Apis mellifica* Linn., and possibly other species of *Apis* (Order, Hymenoptera), and used by the insect to form the cells of the honeycomb. After the extraction of the honey, the wax is melted with water, separated and strained. It occurs as a yellowish-brown solid, brittle when cold, breaking with a dull, granular fracture, but becoming plastic when warmed. It has an agreeable honey-like odour. Beeswax contains about 80 per cent. of myricin, or melissyl palmitate, $C_{15}H_{31}\cdot COOC_{30}H_{61}$, about 15 per cent. of cerotic acid, $C_{26}H_{53}\cdot COOH$, the aromatic body, cerolein, and probably some melissyl stearate. The ratio number is a useful criterion of purity and differs greatly from that of the common adulterants.

Insoluble in water; sparingly soluble in cold alcohol (90 per cent.); soluble in warm ether, chloroform and fixed and volatile oils.

Standard, B.P.—Yellow beeswax has a specific gravity of 0·958 to 0·970. Melting-point, 62° to 64°. Refractive index at 80°, 1·4380 to 1·4420. Acid value, 17 to 23. Ester value, 70 to 80. Ratio number (ester value divided by acid value), 3·3 to 4·0. It complies with tests for absence of fats, fatty acids, Japan wax, resin, ceresin, paraffin and certain other waxes.

Uses.—Yellow beeswax is used in the preparation of plasters and of ointments in which its yellow colour is not objectionable. A mixture of 9 parts of beeswax and 1 part of phenol is used for toothache. A mixture of equal parts of beeswax and hard paraffin, in which sawdust

has been incorporated, is known as Columbia wax, and is used for moulds in the application of radium needles.

CARNAUBA WAX is an exudation from the leaves of *Copernicia cerifera* Mart. (Fam. Palmæ), a palm indigenous to Brazil. The leaves are beaten and the wax collected, melted into a mass and purified. It occurs as a very hard, yellowish or greenish solid which is white when bleached. Melting-point, about 83° to 86°. Specific gravity, 0·990 to 0·999. Carnauba wax contains myricyl cerotate together with myricyl alcohol, cerotic acid and other substances. It is used in the manufacture of varnishes and polishes.

JAPAN WAX is a fat obtained from the berries of various species of *Rhus* (Fam. Anacardiaceæ), the trees being cultivated in China, Japan and California. It is obtained by crushing and steaming the berries, and is bleached by exposure to sunlight. It occurs as a pale yellow solid which becomes white externally on keeping. Melting-point, 50° to 60°. Specific gravity, 0·975 to 0·993. Japan wax contains chiefly palmitin and free palmitic acid. It is used in the manufacture of polishes.

CEREUS
(Cereus)

Cereus

Synonyms—Night-Blooming Cereus; Cactus Grandiflorus.

Cereus consists of the fresh, young shoots of *Cereus grandiflorus* Mill. (Fam. Cactaceæ), a native of the West Indies. It is usually imported preserved in spirit.

The drug consists mainly of the stems, which are angular, simple or rarely branched, 1 to 4 centimetres in diameter, dark green, deeply channelled longitudinally, and bear upon the ridges clusters of 6 to 8 prickly thorns 1 to 6 millimetres long. The transversely cut surface shows from 5 to 9 projecting angles and a large central hollow. The chief constituents of cereus are resins, the presence of the alleged alkaloid, cactine, not having been confirmed.

Substitutes.—The dried flowers of *Opuntia decumana* Haw. and other species of *Opuntia* are sometimes found in commerce and described as cactus flowers. These flowers are small, being 3 to 5 centimetres in diameter.

Action and Uses.—Cereus is supposed to act as a cardiac stimulant and as a partial substitute for digitalis, but there is no proof of its therapeutic value. It has been used in cases of dropsy and various cardiac affections, being administered in the form of liquid extract or tincture.

Preparations

Extractum Cerei Liquidum, B.P.C.—(Ext. Cerei Liq.)—Liquid Extract of Cereus. *Syn.*—Extractum Cacti Grandiflori Liquidum. 1 in 1. Dose.– 0·06 to 0·6 millilitre (1 to 10 minims).

Tinctura Cerei, B.P.C.—(Tinct. Cerei)—Tincture of Cereus. *Syn.*–Tinctura Cacti Grandiflori. 1 in 4. Dose.– 0·12 to 2 millilitres (2 to 30 minims).

CEREVISIÆ FERMENTUM

(Cerevis. Ferment.)

Yeast

Synonym—Faex Medicinalis.

Yeast is an alcohol-forming, unicellular fungus belonging to the family *Saccharomycetaceæ*, a sub-division of the *Ascomycetes*. Several species are used in the fermentation industries, the chief being *Saccharomyces cerevisiæ* Meyen *emend.* Hansen, *S. Carlsbergensis* Hansen, and *S. monacensis* Hansen, of which many different strains and races exist. It is obtained from parent cells by growth in a suitable saccharine and nitrogenous medium (brewers' or distillers' wort).

Brewers' yeast occurs as a viscid, frothy mass, having a peculiar odour and bitter taste. Under the microscope it shows numerous isolated, roundish or oval cells, or short, branched filaments composed of united cells. The cells are transparent, about 7 microns in diameter, with one or two vacuoles; they often contain a somewhat granular protoplasm and increase by budding. Spores are formed under conditions of low nutrition and free aeration. Compressed distillers' yeast, or bakers' yeast, is obtained as a by-product in the manufacture of spirits from malt and raw grain. The skimmings from the fermentation vats are first mixed with water and then passed through a series of sieves. They are then washed by decantation two or three times and again sifted, this time through finer sieves. Finally, when the yeast has completely settled, it is placed in filter-presses, either alone or after admixture with a little starch. After compression, the yeast is separated from the press cloths and made up into convenient form for distribution. Bakers' yeast is also manufactured as the sole product in yeast factories. Large volumes of air are blown through the fermenting wort, a procedure which favours a maximum yeast production and removes the alcohol. Much of this yeast is imported and was formerly described as German yeast. Compressed distillers' yeast occurs as a pasty mass of putty-like consistence, but is occasionally of a crumbly nature. It has an odour similar to that of brewers' yeast and a pleasant, fruity flavour. Dried yeast is prepared by exposing yeast to a temperature of 30°. It occurs as a light grey powder and yields to alcohol about 3 per cent. of extractive.

The liquid (yeast juice) obtained by grinding yeast with sand and subjecting it to high pressure, or by macerating the dried yeast with water and filtering, **contains** the enzyme, zymase. This liquid decomposes solutions of many monosaccharides and disaccharides with production of alcohol and carbon dioxide. A large number of other enzymes are also present in the yeast cell, among them being invertase, which inverts sucrose, maltase, which converts maltose into dextrose, emulsin and a proteolytic endotryptase. Other constituents are fat, ergosterol, the mother substance of the antirachitic vitamin D, zymosterol, glycogen, various other carbohydrates, a considerable proportion of protein, some of which is combined with nucleic

acid to form substances known as nucleins and nucleo-proteins, glutathione, etc. Yeast is a valuable source of the vitamin B complex, being as valuable for vitamin B_1 as are rice polishings. The original vitamin B has been found to be a complex of several factors, perhaps six. Yeasts vary much in their potency, and in the case of a given yeast the stability of factors present may be much altered by details of procedure in the preparation of extracts or in the process of drying; therefore, it is wise to check the biological activity of any sample used. Both brewers' and bakers' yeasts contain vitamins B_1 and B_2 (or G). Vitamin B_1 is much less stable to heat and alkali than vitamin B_2. Hence temperature is an important factor in the drying of yeast; too high a temperature may lower the content of vitamin B_1. It also contains the yeast growth-promoting factor known as "bios."

Action and Uses.—When fresh yeast is given by the mouth it grows actively in the stomach, but its therapeutic action is not due to its property of inciting fermentation. It is given internally in cases of furunculosis. Its action resembles that of nuclein since, if injected, it increases the proportion of leucocytes after a transient leucopænia. Yeast is employed as a means of administering the B vitamins which are essential for growth. The antineuritic vitamin B_1 (anti beri-beri) has been shown to be of great importance to man. It is probable also that vitamin B_2 (anti-dermatitis for rats) has some relation to human pellagra. Yeast improves the appetite and increases intestinal peristalsis; it is, therefore, used in malnutrition, general debility and constipation. When irradiated with ultra-violet light, yeast acquires anti-rachitic properties owing to the conversion of ergosterol into vitamin D. Irradiated yeast may be used in the treatment of rickets and for other purposes for which irradiated ergosterol is employed.

Yeast may be **administered** in the form of compressed yeast shortly before meals, or the yeast cake may be given in suspension in water. Dried yeast may be given by the mouth in capsules or tablets, but large amounts are needed to ensure adequate dosage, and, owing to the necessity for digestion, liberation of all the contained vitamin may be slow. For quicker action (as in the treatment of acute symptoms of beri-beri), rapid absorption can be secured by using soluble extracts, autolysed yeast, or aqueous concentrates.

Dose.– 8 to 16 grammes ($\frac{1}{4}$ to $\frac{1}{2}$ ounce) of compressed yeast; 2 to 4 grammes ($\frac{1}{2}$ to 1 drachm) of dried yeast.

VITAMIN B CONCENTRATES.—Aqueous concentrates of yeast suitable for administration by the mouth may be obtained by simple extraction of the yeast with water or 0·01 per cent. acetic acid solution. The yeast is stirred into twice its volume of boiling water, boiled for three minutes and then filtered. Such an extract will contain much of the vitamin B complex when it is prepared freshly, and is free from the yeast residue. Yeast extracts closely resemble meat extract in colour, taste and smell, and may be distinguished chemically by their freedom from creatinine. It is important to keep the extract slightly acid since vitamin B_1 is sensitive to small amounts of alkali. Alternatively, yeast may be extracted with sufficient alcohol to make a total concentration of from 50 to 70 per cent. Alcohol over 70 per cent. in strength is less efficient for extracting vitamin B_1, and especially B_2. The aqueous

extract, if necessary after removal of alcohol *in vacuo*, may be further purified by adsorption upon fuller's earth or charcoal at appropriate hydrion concentration. Such treatment usually leaves behind vitamin B_2. The latter is thrown out by alcohol concentrations over 80 per cent., and is largely precipitated from aqueous solutions by neutral lead acetate, the B_1 remaining in solution. Concentrates of vitamin B_1 after the adsorption stage can be further purified by precipitation as the platinum or gold chloride compound. Concentrates of vitamin B may also be obtained from wheat-germ. Crystalline concentrates of vitamin B_1 have been obtained such that 0·01 milligram represents the amount of vitamin contained in approximately 1·0 to 2·0 grammes of fresh yeast, 0·3 to 0·4 gramme of a good dried yeast, or 0·3 gramme of an active concentrate.

The purer concentrates of vitamin B_1 are suitable for subcutaneous or intravenous injection, which is necessary when a rapid action is required. Material for injection should be tested biologically owing to the possible presence of other bases of physiological potency such as histamine, which may also be present in yeast extracts. Concentrates of vitamin B_1 from rice polishings have been used with success in the treatment of beri-beri in Java. Vitamin B_1 and B_2 preparations can be standardised by animal tests. For vitamin B_1, curative tests can be made upon pigeons and rats. Alternatively, comparisons with a standard of the amount of growth produced by the unknown preparation may be made with young rats feeding upon a diet complete except for the factor in question. Curative tests with pigeons are made on birds fed for three to four weeks on polished rice until symptoms of polyneuritis appear. The amount of vitamin B_1 can be estimated either by curing rats of the dermatitis produced by a diet free from vitamin B_2 or by growth tests in which this is the missing factor.

The standard for vitamin B_1 is the amount of vitamin B_1 in 10 milligrams of a specimen of Java activated clay (Jansen) kept by the National Institute for Medical Research, London. The dose of vitamin B_1 required by man can be computed approximately upon the assumption that a daily dose is supplied by 500 grammes of unpolished rice, or 35 grammes of rice polishings. The amount needed to provide all the necessary vitamin B_1 would be 3 to 6 grammes of dried yeast, or 25 to 50 grammes of compressed yeast, or extracts equivalent to these amounts. Smaller quantities, of course, would be needed to make good a partial deficiency.

CERII OXALAS

(Cer. Oxal.)

Cerium Oxalate

Cerium oxalate is obtained as a by-product in the separation of thorium from monazite. It consists chiefly of cerium, lanthanum, praseodymium and neodymium oxalates, with smaller quantities of other rare earths; cerium or cerous oxalate, $Ce_2(C_2O_4)_3,10H_2O$ = 724·4, is usually present to the extent of about 50 per cent. It occurs as a white or slightly pink, granular, odourless and tasteless powder. When boiled with potassium hydroxide solution, white insoluble cerium hydroxides are produced, and the filtrate, acidified with acetic acid, produces a white precipitate on the addition of calcium chloride solution. On the addition of 2 millilitres of potassium sulphate solution to a solution of 0·1 gramme of cerium oxalate in 1 millilitre of sulphuric acid, a deposit of small, colourless crystals of double sulphates of potassium and rare earth elements is produced after some time.

Insoluble in water; soluble in diluted sulphuric and hydrochloric acids.

Standard.—Cerium oxalate yields on ignition not less than 47 per cent. of a reddish-brown residue. Arsenic limit, 5 parts per million.

Action and Uses.—Cerium oxalate has been used in cases of chronic vomiting, especially the vomiting of pregnancy. Its action is mechanical and resembles that of the salts of bismuth. It has been given with bismuth for the treatment of gastric ulcer and other inflammatory conditions of the stomach. It may be **administered** in powders or cachets, but should not be given in pills.

Dose.– 0·12 to 0·6 gramme (2 to 10 grains).

CETACEUM
(Cetac.)
Spermaceti

Spermaceti is a solid wax obtained from the head of the sperm whale, *Physeter macrocephalus* Linn. (Fam. Physeteridæ), the bottle-nosed whale, *Hyperoodon rostratus* Billberg (Fam. Ziphiidæ) and possibly other species of *Physeter* which inhabit the Pacific, Atlantic and Indian Oceans. The sperm oil, found in a large cavity in the animal's head, deposits on standing a crystalline substance, which is separated by filtration, pressed, melted, purified from traces of oil with diluted sodium hydroxide solution and finally freed from the soap thus produced and from excess of alkali. Spermaceti occurs in translucent, crystalline, pearly-white masses, unctuous to the touch, with little odour or taste. Specific gravity, about 0·95. It may be powdered with the aid of a little alcohol or olive oil. It is readily inflammable and burns with a bright, somewhat sooty flame. The crystalline appearance of spermaceti, its solubility in boiling alcohol and its very low acidity are good indications of its purity. It consists chiefly of cetyl palmitate.

Insoluble in water and cold alcohol; soluble in ether, chloroform, carbon disulphide, fixed and volatile oils, and boiling alcohol (1 in 50).

Standard.—Spermaceti melts between 42° and 50°. Refractive index at 80°, about 1·4330. Acid value, not more than 1·0. Saponification value, 120 to 136. Iodine value, 3 to 4·4. It dissolves completely in 50 parts of boiling alcohol (absence of paraffin), the solution being neutral or not more than slightly acid to moistened litmus paper.

Action and Uses.—Spermaceti is a common ingredient of domestic cerates and cold creams, such as Unguentum Cetacei and Unguentum Aquæ Rosæ. An emulsion of spermaceti is occasionally prepared for internal use as a demulcent in the treatment of coughs; it is made by reducing the spermaceti to fine powder with a few drops of alcohol and emulsifying with yolk of egg or acacia.

Dose.– 0·5 to 2 grammes (8 to 30 grains).

OLEUM CETACEI.—Sperm oil occurs as a thin, yellow liquid, almost free from odour when of good quality, but often having a slightly unpleasant, fishy odour. Specific gravity, about 0·88. Saponification value, 123 to 147. Iodine value, 79·5 to 84. It is soluble in all proportions of ether, chloroform or light petroleum and insoluble in dehydrated alcohol. It is used as a lubricating oil for machinery, and as a lamp oil.

Preparation

Unguentum Cetacei, B.P.C.—(Ung. Cetac.)—Spermaceti Ointment. Spermaceti 20 per cent., in white beeswax and liquid paraffin.

This ointment was included in the British Pharmacopœia, 1914.

CETRARIA

(Cetrar.)

Iceland Moss

Iceland moss consists of the dried lichen, *Cetraria islandica* (Linn.) Ach. (Fam. Parmeliaceæ), a plant which is indigenous to Great Britain and widely distributed over the Northern Hemisphere. It should be **stored** in a dry place.

The thallus is thin, foliose and cartilaginous, branching fanlike into curled or flattened lobes about 6 millimetres broad and fringed with small outgrowths terminating in pycnidia. It is greenish or greenish-brown above, greyish below and marked with numerous small, white, depressed spots. Occasional apothecia are present and appear as oval, reddish-brown spots, about 5 millimetres by 4 millimetres, near the margin of the thallus. A 5 per cent. decoction gelatinises on cooling and the product is stained blue by iodine. It is odourless and the taste is mucilaginous and bitter.

Iceland moss **contains** the carbohydrate, lichenin, which is accompanied by its isomeride, *iso*lichenin. Lichenin is soluble in hot water, but the solution gelatinises as it cools; *iso*lichenin is soluble in cold water and resembles a soluble modification of starch, but is possibly itself a mixture. Both lichenin and *iso*lichenin are converted into dextrose by boiling with dilute mineral acid. Iceland moss also contains a crystalline bitter principle, fumaroprotocetraric acid, which is easily hydrolysed, giving fumaric and cetraric acids and the tasteless proto-α-lichesteric (lichenostearic) acid. The bitterness of the lichen can be removed by prolonged maceration with water, or by macerating the powder in a dilute solution of an alkali carbonate.

Standard.—Iceland moss contains not more than 2 per cent. of pine leaves and moss, and not more than 3 per cent. of other foreign organic matter.

Action and Uses.—Iceland moss is administered chiefly as decoction (Decoctum Cetrariæ, 1 in 20; dose, 1 to 4 fluid ounces) for its demulcent properties, and in the form of jujubes, the bitter cetraric acid being removed. In the northern countries of Europe it is used

as a food, either made into bread or boiled with milk, the bitterness being to some extent removed by previous washing with water. The decoction made with milk forms a nutritious and demulcent drink.

CEVADILLA
(Cevadill.)
Sabadilla

Synonym—Caustic Barley.

Sabadilla consists of the dried, ripe seeds of *Schœnocaulon officinale* A. Gray (Fam. Liliaceæ), a tall, herbaceous plant growing on the lower mountain slopes of the Eastern coast of Mexico, in Guatemala and in Venezuela. The seeds are freed from the papery pericarp.

The seeds are dark brown in colour, glossy and finely wrinkled, about 6 millimetres long and very narrow. They are slightly curved, acutely pointed at one extremity and more obtuse at the other where both hilum and micropyle are situated, although these are not easily discerned. A longitudinal depression with acute edges is usually visible on one side, due to the mutual pressure of the seeds upon one another in the fruit. The seeds are odourless and have an unpleasant, bitter taste; the powder is a powerful sternutatory.

The diagnostic **microscopical** characters are the radially elongated cells of the epidermis of the seed coat, the outer walls of which are considerably thickened and deep brown in colour; the polygonal cells of the endosperm, with colourless, thick and beaded walls, and containing a granular, nitrogenous substance and fixed oil.

Sabadilla **contains** several alkaloids, of which cevadine (crystalline veratrine) is the most important. Cevadine, $C_{32}H_{49}O_9N$, occurs in colourless crystals, melting at 205°, which have a very powerful sternutatory effect; it is easily hydrolysed by alkalis, yielding cevine (sabadinine) and cevadic (tiglic, methylcrotonic) acid. Cevadine is accompanied by the alkaloids veratridine, cevadilline and sabadine. The seeds also contain cevadic, veratric and chelidonic acids, fatty oil, resin, etc. Veratridine is amorphous and yields by hydrolysis veratric acid and verine (veratroine); like cevadine it has a powerful sternutatory effect. Much confusion has existed in the nomenclature of the alkaloids of sabadilla. The crystalline alkaloid, cevadine, has been termed veratrine; the amorphous alkaloid, veratridine, has also been termed veratrine, and the name has also been given to an indefinite mixture of cevadine and veratridine. Hence it is advisable to discard the name veratrine for any particular alkaloid and to reserve it for the total alkaloids of sabadilla. The identity of another alkaloid, sabadilline, is not clear.

Standard.—Sabadilla contains not more than 4 per cent. of foreign organic matter.

Sabadilla, in powder (Pulvis Cevadillæ: Pulv. Cevadill.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Sabadilla in powder and in the form of Acetum Cevadillæ (1 in 10), or as an ointment (1 in 4), has been used as a parasiticide, especially for pediculi capitis.

CHENOPODIUM
(Chenopod.)

Chenopodium

Synonym—American Wormseed.

Chenopodium consists of the fruit of *Chenopodium ambrosioides* var. *anthelminticum* A. Gray (Fam. Chenopodiaceæ), an annual or perennial plant abundant in the Southern United States and Central America. The fruit is collected in the autumn.

The fruits are small and subglobular, each surrounded by the five-partite perianth, from 0·7 to 1·0 millimetre in diameter, very light, and dull greenish-yellow or brownish in colour. The odour is strong, peculiar, and recalls that of eucalyptus, and the taste is pungent and bitter. On gently rubbing the fruit, the perianth and membranous pericarp are removed, exposing a single, shining, black, lenticular seed about 0·5 to 0·9 millimetre in diameter, containing a strongly curved embryo and a scanty endosperm. The fruits occasionally occur in small groups attached to short pieces of stem.

Chenopodium **contains** about 1 per cent. of volatile oil, which consists mainly of ascaridole and is contained in the glandular hairs of the pericarp.

Substitutes.—*Chenopodium ambrosioides* Linn., an annual plant widely distributed throughout the United States, is known as Mexican Tea. It bears a fruit similar to that of *C. ambrosioides* var. *anthelminticum*, but both the fruits and the volatile oil obtained from them have a less aromatic odour.

Standard.—Chenopodium contains not more than 2 per cent. of stalks and other foreign organic matter. Acid-insoluble ash, not more than 1·5 per cent.

Chenopodium, in powder (Pulvis Chenopodii : Pulv. Chenopod.), complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Chenopodium is a vermifuge used to expel round-worms and hook-worms. It is **administered** in the form of powder, but the volatile oil, Oleum Chenopodii, is now generally preferred. It should be taken at bedtime, fasting, and followed by a purgative.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

CHIMAPHILA
(Chimaphil.)
Chimaphila

Synonyms—Chimaphila Leaves; Pipsissewa.

Chimaphila consists of the dried leaves of *Chimaphila umbellata* Nutt. (Fam. Pyrolaceæ), a small, evergreen plant indigenous to the northern latitudes of Europe, America and Asia.

The leaves are simple and shortly petiolate, the lamina oblanceolate, about 2·5 to 8 centimetres long, 0·8 to 1·8 centimetres broad, and entire. The apex is acute or slightly obtuse, the margin distantly serrate in the apical half and almost entire in the basal half; the texture is coriaceous, the surface smooth and the venation pinnate, the veins being prominent on the under surface. It has a slight odour and an astringent, bitter taste.

The diagnostic **microscopical** characters are the epidermal cells with wavy, moderately thickened walls, the broadly elliptical stomata in the lower epidermis only and the cluster-crystals of calcium oxalate.

Chimaphila is said to **contain** various crystalline constituents, to one of which the name chimaphilin has been applied. It is described as occurring in yellow needles melting at 113° to 114°, and having a composition corresponding to the formula, $C_{24}H_{21}O_4$. Arbutin is also said to be present, together with resin, gum, starch, tannic acid, sugar, etc.

Standard.—Chimaphila contains not more than 5 per cent. of stems or other foreign organic matter.

Action and Uses.—Chimaphila is employed as a diuretic in cardiac and renal disease. It is **administered** in the form of liquid extract (1 in 1) or may be made into a syrup by mixing one part of the liquid extract with three parts of syrup.

Dose.– 1 to 3 grammes (15 to 45 grains).

CHIRATA
(Chirat.)
Chiretta

Synonym—Chirayta.

Chiretta is the dried plant *Swertia Chirata* Buch.-Ham. (Fam. Gentianaceæ), an erect, annual herb indigenous to the mountainous districts of Northern India. It is collected when in flower, dried and packed into bundles, about a metre long, which are often compressed before exportation.

The stem, which forms the major part of the drug, measures up to about 1 metre in length and 6 millimetres in diameter; it is purplish-brown, glabrous, slightly winged, much branched above, and has a narrow wood enclosing a large, continuous, easily separable, yellow

pith. The branches are slender, opposite and decussate, and bear numerous fruits, some flowers and a few leaves. The fruits are superior, ovoid and pointed, bicarpellary, unilocular, and contain numerous minute reticulated seeds. The flowers are small and panicled, the leaves opposite, sessile, ovate or lanceolate, with five to seven prominent, curving, lateral veins, and glabrous; the root is small and always oblique, attaining 10 centimetres in length and 12 millimetres in diameter at the crown. The drug is odourless and the taste intensely bitter.

Chiretta **contains** two amorphous bitter principles, chiratin and ophelic acid. The former is soluble in warm water, alcohol and ether, and when boiled with hydrochloric acid yields ophelic acid and chiratogenin. Chiretta yields to alcohol (60 per cent.) about 10 to 15 per cent. of extractive.

Substitutes.—Various other species of *Swertia* (e.g. *S. angustifolia* Buch.-Ham.; *S. alata* Royle; *S. trichotoma* Wall.) have been found mixed with or substituted for chiretta. From these the genuine drug may easily be distinguished by its dark colour, intensely bitter taste and continuous pith. *Andrographis paniculata* Nees (q.v.) can be distinguished easily by its less bitter taste, its green colour, numerous erect, slender, opposite branches and lanceolate, green leaves. The roots of *Rubia cordifolia* Linn. are also occasionally present; they are readily distinguished by their purple colour. Japanese chiretta, from *S. chinensis* Franchet, is a much smaller plant, varying from 10 to 35 centimetres in length and with a stem 1 to 2 millimetres thick; it is more bitter than *S. Chirata*.

Standard.—Chiretta contains not more than 5 per cent. of foreign organic matter. Acid-insoluble ash, not more than 1 per cent.

Chiretta in powder (Pulvis Chiratæ : Pulv. Chirat.), contains the constituents and possesses the diagnostic characters of Chirata, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Chiretta owes its action to its bitterness. It is used in dyspepsia to improve the appetite, and is usually **administered** in the form of infusion or tincture. The preparations of chiretta do not contain tannin and may, therefore, be prescribed with iron.

Dose.– 0·3 to 2 grammes (5 to 30 grains).

ANDROGRAPHIS.—Andrographis (Creyat; Kiryat; Kreat) is the entire dried plant, *Andrographis paniculata* Nees (Fam. Acanthaceæ), an annual plant indigenous to India, Ceylon and Java. The stem, which is dark green in colour, is from 0·3 to 1 metre in height, attaining a diameter of about 3 to 6 millimetres; it is quadrangular, with longitudinal furrows, and slightly enlarged at the nodes. The leaves are opposite and decussate, lanceolate, up to about 8 centimetres long and 2·5 centimetres broad. The root is simple, woody and fusiform, and the small flowers and fruits are present. The drug is odourless and the taste is intensely bitter. The chief constituents are two non-nitrogenous, bitter principles, one of which is crystalline. It is used in India and the Eastern Colonies as an equivalent of chiretta. It owes its action to the presence of a bitter principle, the properties of which are similar to those of gentian root.

Preparations

Infusum Chiratæ Concentratum, B.P.C.—(Inf. Chirat. Conc.)—Concentrated Infusion of Chiretta. 1 in 2½. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of chiretta, and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Infusum Chiratæ Recens, B.P.C.—(Inf. Chirat. Rec.)—Fresh Infusion of Chiretta, 1 in 20. When infusion of chiretta or Infusum Chiratæ is prescribed, fresh infusion not being specified, either Infusum Chiratæ Recens, or Infusum Chiratæ Concentratum suitably diluted, may be dispensed. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This infusion was included in the British Pharmacopœia, 1914, under the name of Infusum Chiratæ.

Tinctura Chiratæ, B.P.C.—(Tinct. Chirat.)—Tincture of Chiretta. 1 in 10. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

CHLORALFORMAMIDUM

(Chloralformam.)

Chloral Formamide

$C_3H_4O_2NCl_3 = 192{\cdot}4$

Synonym—Chloralamide.

Chloral formamide, $CCl_3{\cdot}CH(OH){\cdot}NH{\cdot}CHO$, may be prepared by gently heating chloral and formamide in molecular proportions. It sets, on cooling, to a solid mass and may be purified by recrystallising from water or 30 per cent. alcohol, avoiding heating above 55°. It occurs in colourless, lustrous, odourless crystals, with a somewhat bitter taste. It hydrolyses in aqueous solution at 60° yielding chloral hydrate and formamide. It is unaffected by dilute acids, but decomposes when warmed with sodium hydroxide solution, chloroform separating and ammonia and sodium formate being produced.

Soluble in water (1 in 21), alcohol (1 in 2); readily soluble in ether, acetone and ethyl acetate; slowly soluble in glycerin (1 in 12).

Standard.—Chloral formamide melts between 114° and 115°. It volatilises without the evolution of inflammable vapours (absence of certain organic impurities) and leaves not more than 0·01 per cent. of residue. 1 gramme dissolved in 25 millilitres of water yields a solution which is neutral to litmus and does not become turbid immediately on the addition of silver nitrate solution (limit of chloride).

Action and Uses.—Chloral formamide is a hypnotic, slower in action and safe than chloral, since it has not the same depressant action on the heart. It appears to be absorbed more slowly than chloral hydrate, and after absorption is converted into chloral and excreted partly as urochloralic acid. It is very slowly excreted and repeated doses lead to cumulation; when the stored drug reaches a certain amount, it appears to be set free suddenly in the circulation, causing symptoms of acute poisoning with collapse. It is especially useful in the insomnia of cardiac disease and acute alcoholism.

Chloral formamide may be **administered** in solution made by dissolving 1 part of chloral formamide in 2½ parts of alcohol, diluting

with water to 30 parts and flavouring with orange or liquorice; hot water must not be used. When the proportion soluble in water is exceeded and alcohol is undesirable, the finely powdered chloral formamide may be suspended with mucilage of acacia. If prescribed in powder form, with or without potassium bromide, the powders should be covered with tin foil. Chloral formamide is a common ingredient, with potassium bromide, of remedies for sea-sickness. It is **incompatible** with alkalis and should not be given in hot liquids.

Dose.– 1 to 3 grammes (15 to 45 grains).

CHLORALIS HYDRAS
(Chloral. Hydr.)
Chloral Hydrate
$C_2H_3O_2Cl_3 = 165{\cdot}4$

Chloral hydrate, or trichloroethylideneglycol, $CCl_3{\cdot}CH(OH)_2$, is obtained by the combination of water with anhydrous chloral which may be prepared by the action of dry chlorine on ethyl alcohol. The product is crystallised from water and purified by recrystallisation from chloroform or other solvent. It occurs in colourless, transparent, non-deliquescent crystals with a pungent, but not acrid, odour and a pungent, somewhat bitter taste. It volatilises slowly on exposure to air. When heated, chloral hydrate liquefies between 50° and 58°. The aqueous solution is neutral or only slightly acid to litmus and when mixed with sodium hydroxide solution, chloroform is produced. Chloral hydrate forms a liquid mixture when triturated with many organic compounds such as camphor, menthol, thymol, phenol and phenazone.

Soluble in water (4 in 1), alcohol (90 per cent.) (5 in 1), chloroform (1 in 3), ether (2 in 1) and fixed and volatile oils.

Standard, B.P.—Chloral hydrate contains not less than 99 per cent. of $C_2H_3O_2Cl_3$. Ash, not more than 0·05 per cent. It complies also with tests for the absence of certain organic impurities, chloral alcoholate, and chloride.

Action and Uses.—Chloral hydrate is a hypnotic. It is rapidly absorbed from the stomach and may produce its effects within a few minutes. In small doses it induces a condition closely resembling natural sleep, from which the patient can easily be awakened by ordinary means. Such sleep usually lasts from six to eight hours, and after-effects from the drug are not usually experienced, though headache and giddiness may result. Chloral hydrate depresses the central nervous system, dulling the sensory and motor functions of the brain and spinal cord. It has not the analgesic and anodyne action of morphine, and acute pain may prevent the production of sleep by chloral hydrate. It is of

special value as a hypnotic in simple nervous insomnia, in puerperal mania, insanity and delirium tremens. Chloral hydrate and concentrated solutions of chloral hydrate blister the skin; as a vesicant it may be applied spread on adhesive plaster. A mixture with camphor is applied to the skin for its local anodyne properties.

Chloral hydrate is usually **administered** in dilute solution as syrup of chloral or in combination with potassium bromide. It should not be taken in the form of tablets or pills since these concentrated forms may damage the mucous membrane of the mouth and alimentary tract. It is a powerful deodorising, antiseptic and preservative agent. Spray solutions (2 per cent.) may be used in tonsillitis. It is sometimes used in hair washes for its antiseptic properties, in the proportion of 2 grains to 1 fluid ounce. Chloral hydrate is excreted in the urine in combination with glycuronic acid and sulphuric acid. These excretion products may be present in sufficient concentration to reduce Fehling's solution.

The toxic effects of larger doses of chloral hydrate are shown by a fall in temperature and blood pressure, with a slow and feeble respiration. In cases of **poisoning,** the stomach should be emptied and washed out with water at 105°F., the patient being kept warm. Strychnine and caffeine should be given and artificial respiration used, if necessary. Chloral hydrate is **incompatible** with alkalis, alkaline earths and alkali carbonates.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

GLUCOCHLORAL.—Glucochloral, $C_8H_{11}O_6Cl_3$, occurs as fine, colourless, acicular crystals, having a bitter and nauseous taste. Melting-point, 185°; it volatilises without decomposition. It is soluble in water (1 in 170), freely soluble in hot water and alcohol. Glucochloral is a hypnotic and sedative for use in simple insomnia. It should be used with care, since its effects are uncertain, and symptoms of poisoning have followed a dose of 0·5 gramme (8 grains). In cases of poisoning by glucochloral, the antidotes recommended under chloral hydrate should be employed. Dose.– 0 2 to 0 6 gramme (3 to 10 grains).

Preparations

Chloral Camphoratum, B.P.C.—(Chloral Camph.)—Camphorated Chloral. *Syn.*—Chloral cum Camphora. The liquid obtained by mixing equal weights of chloral hydrate and camphor.

Liquor Bromidi Compositus, B.P.C.—(Liq. Brom. Co.)—Compound Bromide Solution. *Syn.*—Liquor Bromochloral Compositus. Each fluid drachm contains 15 grains of chloral hydrate and 15 grains of potassium bromide, with extract of cannabis, liquid extract of hyoscyamus, tincture of orange, glycerin and distilled water. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Pigmentum Chloralis et Camphoræ Compositum, B.P.C.—(Pig. Chloral. et Camph. Co.)—Compound Chloral and Camphor Paint. Equal weights of chloral hydrate, camphor and phenol.

Syrupus Chloralis, B.P.C.—(Syr. Chloral.)—Syrup of Chloral. Chloral hydrate, 1 in 5, in distilled water and syrup; each fluid drachm contains about 11 grains of chloral hydrate. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

This syrup was included in the British Pharmacopœia, 1914, under the name of Syrupus Chloral.

Sirupus chlorali hydrati I.A. contains 5 per cent. of chloral hydrate.

CHLORAMINA
(Chloram.)
Chloramine

$C_7H_7O_2NClSNa,3H_2O = 281{\cdot}6$

Synonym—Chloramine-T.

Chloramine is sodium *p*-toluenesulphonchloroamide, $CH_3{\cdot}C_6H_4{\cdot}SO_2Na{:}NCl,3H_2O$, and may be prepared by the limited interaction of *p*-toluenesulphonamide with a cold 5 per cent. alkaline solution of sodium hypochlorite, filtering and adding saturated sodium chloride solution. The crystals which separate are collected, washed with brine and dried in air. Chloramine occurs as white crystals or as a crystalline powder with a faint odour of chlorine and an unpleasant, bitter taste. On exposure to air, chloramine effloresces and decomposes slowly, giving off chlorine and acquiring a yellow colour; it is decomposed slowly by alcohol (95 per cent.). Heated at 100°, it becomes anhydrous without undergoing decomposition; on ignition, decomposition occurs suddenly and a residue containing sodium sulphate remains. The aqueous solution has a slightly alkaline reaction; on the addition of an acid, a white precipitate is produced which redissolves when the mixture is again rendered alkaline. On the addition of chloramine to a solution of potassium iodide, iodine is liberated. Chloramine may be distinguished from dichloramine by the fact that it does not liberate bromine from sodium bromide solution until the mixture is acidified. Chloramine should be **stored** in well-closed glass containers, protected from light and in a cool place.

Soluble in water (about 1 in 7), boiling water (1 in 2) and alcohol (90 per cent.) (1 in 12); insoluble in ether, chloroform and benzene.

Standard, B.P.—Chloramine contains not less than 98 per cent. and not more than the equivalent of 103 per cent. of $C_7H_7O_2NClSNa,3H_2O$. It complies also with limit tests for readily carbonisable substances, the corresponding *ortho* compound and sodium chloride.

Action and Uses.—Chloramine is a powerful antiseptic and is sometimes used to replace a solution of hypochlorites in the irrigation of wounds by the Carrel-Dakin method and, being nearly neutral and less irritant, is sometimes preferred. For this purpose a 2 per cent. solution is suitable. As a mouth-wash or as an injection for the bladder or urethra, a 0·5 per cent. solution may be used. Chloramine has no special solvent action on necrosed tissue. Aqueous solutions of chloramine are comparatively stable and may be kept for a considerable period without undergoing decomposition.

HALAZONE.—Halazone is *p*-sulphondichloroamidobenzoic acid, $C_6H_4(SO_2NCl_2)COOH$, a white powder with a strong odour of chlorine. A mixture with sodium carbonate is sometimes used for the sterilisation of water in the proportion of 0·004 to 0·008 gramme to 1 litre of water.

Preparation

Carbasus Chloraminæ, B.P.C.—(Carbas. Chloram.)—Chloramine Gauze. It contains from 4 to 6 per cent. of chloramine.

CHLORBUTOL
(Chlorbutol)
Chlorbutol

$C_4H_7OCl_3 = 177{\cdot}4$

Chlorbutol is trichloro-*tert.*-butyl alcohol, $(CH_3)_2C(CCl_3)OH$, with a variable amount of water of crystallisation, and may be prepared by heating a mixture of acetone and chloroform with potassium hydroxide. It occurs in colourless crystals with a characteristic musty and somewhat camphoraceous odour and taste. It volatilises at ordinary temperatures. When anhydrous, it melts at 96°; the boiling-point is about 167°. When solution of iodine is added to an aqueous solution of chlorbutol rendered alkaline by means of dilute sodium hydroxide solution, iodoform is produced. When chlorbutol is warmed with aniline and potassium hydroxide solution, the odour of phenyl isocyanide is produced. It should be **stored** in well-closed containers.

Soluble in water (1 in 125), alcohol (90 per cent.) (1 in 1), ether, chloroform, glycerin (1 in 10) and volatile oils.

Standard, B.P.—Chlorbutol has a melting-point not below 78°. Ash, not more than 0·1 per cent. It complies with a test for acidity and with a limit test for chloride.

Action and Uses.—Chlorbutol is sedative, analgesic and antiseptic. As a hypnotic, it is not of much value since its dose for this purpose is near the amount liable to cause toxic symptoms. Its sedative properties are especially exerted upon the stomach, and it is used in sea-sickness and to allay post-operative vomiting. It is useful in the treatment of chorea. An enema of 1·2 grammes (20 grains) of chlorbutol dissolved in glycerin or olive oil is useful for controlling the muscular spasms in tetanus. It resembles chloral in most respects, but is less depressing to the heart and not so irritating to mucous membranes. Like chloral formamide its action is cumulative. Chlorbutol, in small doses, causes insensitiveness of the bladder, resulting in some cases in retention of urine; this property makes it of service for controlling frequent micturition. A saturated solution in water with the addition of Liquor Adrenalinæ Hydrochloridi (2 fluid drachms to each ounce of solution) is employed in conjunctivitis due to irritant gases. As an antispasmodic, chlorbutol is employed in acute gastric flatulence, persistent hiccough, or the severe pain of shingles. A saturated aqueous solution, in doses equivalent to 0·06 gramme (1 grain) three or four times a day, is employed to relieve the paroxysms of whooping cough. **Externally,** chlorbutol is employed to relieve pruritus and the irritation of chronic skin diseases. A solution in liquid paraffin, inhaled as a spray from an atomiser, is used as an antiseptic and analgesic to relieve catarrh.

Chlorbutol may be **administered** in powders, which should be dispensed in a bottle if they are to be kept for any length of time. Tablets of chlorbutol are not readily soluble, and it should be given preferably in gelatin capsules. Chlorbutol may be suspended in mixtures with acacia or

tragacanth, or an elixir may be prepared containing 0·6 gramme (10 grains) of chlorbutol in 4 millilitres (1 fluid drachm) each of alcohol (or compound tincture of cardamom or tincture of orange) and glycerin. It may be dissolved in ten times its weight of olive oil or liquid paraffin and the solution emulsified. Chlorbutol is used as a preservative of solutions for hypodermic injection.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

CHLOROFORMUM

(Chlorof.)

Chloroform

$CHCl_3 = 119·4$

Chloroform is trichloromethane to which from 1 to 2 per cent. by volume of dehydrated alcohol has been added. It may be prepared by the action of chlorinated lime, slaked lime and water on acetone, ethyl alcohol, or industrial methylated spirit and subsequent purification. It occurs as a colourless, heavy, volatile liquid with a characteristic odour and a sweet, burning taste. It is non-inflammable, but the strongly heated vapour may be ignited; it burns with a green flame with production of noxious vapours. On exposure to air and light, pure chloroform is gradually oxidised, becoming contaminated with the very poisonous carbonyl chloride (phosgene) and with chlorine. In the medicinal grade of chloroform this decomposition is greatly retarded by the addition of the small percentage of alcohol; the alcohol serves also to decompose any carbonyl chloride that may be formed. When warmed with a trace of aniline and sodium hydroxide solution, the odour of phenyl isocyanide is produced. Chloroform should be **stored** in well-closed, glass-stoppered bottles, protected from light.

Soluble in water (1 in 200); miscible in all proportions with dehydrated alcohol, ether, fixed and volatile oils and most organic solvents.

Standard, B.P.—Chloroform has a specific gravity of 1·485 to 1·490. On distillation, a portion, usually not more than 15 per cent. v/v, distils below 60°, the remainder distilling between 60° and 62°. Residue on evaporation, not more than 0·004 per cent. w/v. No foreign odour is detectable during the evaporation of 10 millilitres on filter paper. It complies also with limit tests for acidity, chloride, free chlorine, hydrochloric acid, foreign organic matter, foreign chlorine compounds, decomposition products and aldehyde.

Action and Uses.—Chloroform is the best known member of the group of drugs classed as general anæsthetics. When inhaled, it produces a feeling of warmth in the throat, which is followed by relaxation and, finally, unconsciousness. For anæsthesia by inhalation, chloroform should not exceed about 1 per cent. of the inspired air. Chloroform should

not be given to diabetics, nor to patients with heart or kidney disease, nor to those suffering from shock. It is unsuitable in the presence of sepsis, but is valuable in operations on the upper abdomen since the respiratory exertions are less marked than under ether anæsthesia. The great danger of chloroform inhalation is in the sudden absorption of a large dose during the early stages of administration. This either excites the medulla and the heart ceases to beat as the result of vagal inhibition, or the ventricles fibrillate, possibly as a result of sympathetic stimulation. Treatment of this condition should consist of artificial respiration, inhalation of carbon dioxide, the injection of atropine in normal saline solution directly into a vein, the intravenous injection of adrenaline (1 in 100,000) or pituitary (posterior lobe) extract well diluted and cardiac tonics, as well as the more usual means adopted for rousing the activity of the heart. In the third stage of chloroform narcosis, depression of the heart muscle results from the direct toxic action of the drug. This condition is improved by stopping the administration for a time. Unfortunately all statistics of deaths occurring during anæsthesia agree in showing that chloroform is more dangerous than any other commonly used anæsthetic.

The advantages of chloroform over ether are its more agreeable odour and its rapidity of action; it is less likely to set up irritation of the respiratory passages or to cause nausea and vomiting. After prolonged anæsthesia, especially in delicate subjects and children, a condition known as delayed chloroform poisoning may occur. The symptoms are first observed from one to four days after the administration of the anæsthetic, and consist of vomiting, delirium and coma, with the appearance of acetone bodies in the urine. The pathology and general condition is very similar to that seen after poisoning by the organic preparations of arsenic. This condition is unlikely to occur when the patient has been kept on a rich carbohydrate diet and if dextrose is given shortly before the administration of the anæsthetic. A.C.E. Mixture (Vapor Chloroformi Compositus) contains dehydrated alcohol, 1 part, chloroform, 2 parts, and ether, 3 parts (by volume), and is a safer anæsthetic than pure chloroform when deep and prolonged anæsthesia is required. C.E. Mixture (Vapor Chloroformi et Ætheris) contains chloroform, 1 part, and ether, 3 parts (by weight).

Administered by the mouth, chloroform causes a sensation of warmth in the stomach and is a useful carminative in gastric flatulence and pain. Glass capsules or ampoules of chloroform, containing 0·6 millilitre (10 minims) or more, enclosed in absorbent material, are broken and the vapour inhaled for the relief of asthma. Similar capsules containing 20 minims are used for the production of analgesia during childbirth. As flavouring and preservative agents, stimulants and carminatives, Aqua Chloroformi, Emulsio Chloroformi, Spiritus Chloroformi, and Tinctura Chloroformi Composita are in constant use. Perles or capsules for internal use contain usually 0·2 millilitre (3 minims) of chloroform. **Externally,** chloroform is rubefacient. It is applied over neuralgic areas, and in gout, lumbago and rheumatism,

often with menthol, belladonna, or aconite. Linimentum Chloroformi is a counter-irritant; Chloroformum Camphoratum is used for toothache. Chloroform is a useful preservative for aqueous preparations of vegetable and animal extracts, one minim in each fluid ounce being a suitable proportion. It is also used as a solvent for resins, alkaloids, fats, fixed and volatile oils, gutta percha and rubber. In cases of **poisoning** by swallowing chloroform, the stomach pump should be used, or an emetic administered, followed by large draughts of water containing sodium carbonate in solution and the injection of strong hot coffee into the rectum.

Dose.– 0·06 to 0·3 millilitre (1 to 5 minims).

Preparations

Aqua Chloroformi, B.P.—(Aq. Chlorof.)—Chloroform Water. Chloroform, 1 in 400, in distilled water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Aqua Chloroformi Concentrata, B.P.C.—(Aq. Chlorof. Conc.)—Concentrated Chloroform Water. Chloroform, 1 in 10. One part added to 39 parts of distilled water yields a preparation which is equivalent in strength to chloroform water, but contains 1·5 per cent. v/v of alcohol (90 per cent.). Dose.– 0·4 to 0·8 millilitre (6 to 12 minims).

Aqua Chloroformi Duplex, B.P.C.—(Aq. Chlorof. Dup.)—Double Chloroform Water. *Syn.*—Aqua Chloroformi Fortior; Stronger Chloroform Water. Chloroform, 1 in 200, in distilled water. Dose.– 8 to 16 millilitres (2 to 4 fluid drachms).

Chloroformum Camphoratum, B.P.C.—(Chlorof. Camph.)—Camphorated Chloroform. *Syn.*—Chloroform of Camphor. Camphor, 2 parts by weight, dissolved in chloroform, 1 part by volume.

Emulsio Chloroformi, B.P.C.—(Emuls. Chlorof.)—Emulsion of Chloroform. Chloroform, 1 in 20, with tincture of quillaia, mucilage of tragacanth and distilled water. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Linimentum Aconiti Oleosum, B.P.C.—(Lin. Aconit. Oleos.)—Liniment of Aconite with Oil. *Syn.*—A.B.C. Liniment. Equal parts of liniments of aconite, belladonna and chloroform. (The non-oily liniment of the British Pharmaceutical Codex, 1923, is included under the name of Pigmentum Aconiti Compositum).

Linimentum Belladonnæ cum Chloroformo, B.P.C.—(Lin. Bellad. c. Chlorof.)—Liniment of Belladonna with Chloroform. Chloroform, 1 in 8, with liniment of belladonna.

Linimentum Chloroformi, B.P.C.—(Lin. Chlorof.)—Liniment of Chloroform. Chloroform and liniment of camphor, equal parts.

This liniment was included in the British Pharmacopœia, 1914.

Spiritus Chloroformi, B.P.—(Sp. Chlorof.)—Spirit of Chloroform. Chloroform, 5 per cent. v/v, in alcohol (90 per cent.). Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Tinctura Chloroformi Composita, B.P.C.—(Tinct. Chlorof. Co.)—Compound Tincture of Chloroform. Chloroform, 1 in 10, with alcohol (90 per cent.) and compound tincture of cardamom. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm)

Tinctura Chloroformi et Morphinæ, B.P.C.—(Tinct. Chlorof. et Morph.)—Tincture of Chloroform and Morphine. *Syn.*—Chlorodyne; Tinct. Chlorof et Morph. B.P.'85. Chloroform, 1 in 8, and morphine hydrochloride, about 1 in 450, with ether, alcohol (90 per cent.), dilute hydrocyanic acid, about 1 in 16, oil of peppermint, liquid extract of liquorice, treacle and syrup. Dose.– 0·3 to 0·6 millilitre (5 to 10 minims)

Tinctura Chloroformi et Morphinæ Composita, B.P.C.—(Tinct. Chlorof. et Morph. Co.)—Compound Tincture of Chloroform and Morphine Chloroform, about 1 in 13, morphine hydrochloride, 1 in 100, with dilute hydrocyanic acid, about 1 in 20, tincture of capsicum, tincture of cannabis, oil of peppermint, glycerin and alcohol (90 per cent) Dose.– 0 3 to 1 millilitre (5 to 15 minims).

This tincture was included in the British Pharmacopœia, 1914.

CHLOROPHYLLUM
(Chlorophyll.)

Chlorophyll

Chlorophyll is the green colouring matter of the leaves and green parts of plants. It is an amorphous organic compound consisting of an ester-like combination of phytol and methyl alcohol with a complex tricarboxylic acid containing magnesium. By the action of acids the magnesium is replaced by hydrogen and a brownish, amorphous product, termed pheophytin, is obtained. Both natural chlorophyll and pheophytin are used medicinally. They are distinguished from the commercial derivatives, which are used as colouring matters and in which the magnesium is replaced by copper or zinc, by the absence of these metals and by the intense fire-red fluorescence which they give in ultra-violet light even in very dilute solution. For non-medicinal or technical purposes, chlorophyll derivatives are prepared by extraction from nettles spinach and other green plants in the presence of copper, removing yellow colouring matter and other impurities, and modifying the solubility of the product. Fat-soluble chlorophyll is prepared by diluting the purified extract with varying amounts of a suitable fat, the proportion depending on the strength of the colouring matter required. Alcohol-soluble chlorophyll is similarly obtained by diluting the extract with castor or other suitable oil. Water-soluble chlorophyll is obtained by the action of dilute alkalis on the purified extract.

Action and Uses.—Chlorophyll, when administered in large doses, is stated to possess blood-forming properties, particularly when given with iron. This action may be due to its having a somewhat similar chemical composition to that of hæmoglobin. It is employed principally for colouring fats, oils, soaps and other preparations.

CHONDRUS
(Chond.)

Chondrus

Synonyms—Carrageen; Irish Moss.

Chondrus consists of the dried seaweed, *Chondrus crispus* Stackhouse (Fam. Gigartinaceæ), which is found on the northern shores of the Atlantic Ocean, but collected for medicinal purposes chiefly on the

northern shores of Brittany where it grows below low-water mark upon rocks and stones. It is green or purplish-brown when fresh, but is partly bleached by watering and exposing it to the sun, after which it is dried.

The drug occurs in yellowish, translucent, horny masses which consist of slender thalli varying from 5 to 30 centimetres in length, rounded at the base, but flattened in the upper part, and branching dichotomously, the ultimate branches having an emarginate or two-lobed apex. Here and there in the branches of the thallus are small oval patches or openings, which are the fructifications (cystocarps) or the places from which they have fallen. Microscopically the drug has a cellular structure, compact in the outer layers and filamentous axially; all the cell walls are composed of a form of cellulose.

The aqueous extract **contains** two colloidal substances which are considered to be mixtures of salts of sulphuric acid united to a carbohydrate-yielding complex. Carrageenin is the name given to the mixture of substances soluble in boiling water. The drug also contains about 7 per cent. of proteins and a little iodine. It yields about 25 to 40 per cent. of extractive to cold water and about 70 to 85 per cent. to boiling water.

Substitutes.—*Gigartina mamillosa* Agardh. resembles chondrus, but can be distinguished by the numerous papillæ on the ultimate segments. It is said to possess similar properties.

Standard.—Chondrus contains not more than 2 per cent. of foreign organic matter.

Action and Uses.—Chondrus is used in the form of a decoction as a demulcent in the treatment of coughs. It is also employed as an emulsifying agent for cod-liver and other oils and as a substitute for gelatin in the preparation of jellies for invalids.

Preparation

Decoctum Chondri, B.P.C.—(Dec. Chond.)—Decoction of Chondrus. *Syn.*—Decoction of Irish Moss; Mucilago Chondri; Mucilage of Irish Moss. 1 in 40. **Dose.**– 30 to 120 millilitres (1 to 4 fluid ounces), or more.

CHROMII TRIOXIDUM

(Chrom. Triox.)

Chromium Trioxide

$CrO_3 = 100{\cdot}0$

Synonyms—Acidum Chromicum; Chromic Acid; Chromic Anhydride.

Chromium trioxide may be prepared by adding sulphuric acid to an aqueous solution of potassium dichromate. It occurs in dark red, odourless, acicular crystals or in dark brown masses, and is very corrosive. On heating, it melts at about 192°, evolving oxygen at higher temperatures and forming at a red heat the insoluble, green chromium

sesquioxide, Cr_2O_3. In contact with small amounts of organic matter such as alcohol (90 per cent.), ether, or glycerin, it is liable to sudden combustion or explosion. When warmed with hydrochloric acid, chlorine is evolved. On the addition of alkali hydroxides to the aqueous solution, the corresponding chromate is formed and the solution gives a yellow precipitate on the addition of a solution of lead acetate. On the addition of dilute sulphuric acid and solution of hydrogen peroxide to a dilute aqueous solution of chromium trioxide, the mixture acquires a blue colour; when ether is added and the mixture shaken, and allowed to stand, the ethereal layer has a blue colour. It should be **stored** in a well-closed, stoppered bottle.

Soluble in water (2 in 1) and ether.

Standard, B.P.—Chromium trioxide contains not less than 95 per cent. of CrO_3. Water-soluble matter after ignition, not more than 2 per cent. It complies also with a limit test for sulphate.

Action and Uses.—Chromium trioxide is a powerful oxidising agent and caustic. It is not given internally, but is used to destroy granulations and excrescences and to wash out infected wounds. For the destruction of warts, superficial growths and indolent ulcerations, it is used in a concentrated aqueous solution (1 in 1) or as Liquor Chromii Trioxidi, applied with a glass rod, the surrounding tissues being protected if necessary by smearing with soft paraffin. Solutions (1 in 50 to 1 in 20) are used for affections of the tongue and mouth, as well as for application to the feet in hyperhidrosis and bromidrosis, while a 1 in 500 solution is used as a gargle. As a general lotion and injection for antiseptic purposes, a very weak solution (1 in 2000 or 4000) may be used.

Chromium trioxide is **incompatible** with most organic substances; it decomposes alcohol and glycerin with evolution of heat. Inhalation of air containing chromium trioxide, in the proportion of 1 milligram in 10 cubic metres (or less) of air, causes bleeding from the nose followed by perforation of the nasal septum. This occurs among workers in the chromium plating industry, where ulcers or "chrome holes" may appear also on the hands or other exposed parts of the body, but can, to a large extent, be prevented by the application of soft paraffin.

ACIDUM OSMICUM.—Osmic acid, OsO_4, occurs as yellow crystals melting at about 40°; boiling-point, below 100°. Its vapour is very irritating and extremely poisonous, attacking the eyes and lungs. It is decomposed by contact with organic substances and is used in 1 and 2 per cent. w/v solutions for hardening animal tissues prior to cutting sections and for staining fats in microscopical work. Its solution gives a purple colouration with tannic acid and other derivatives of pyrogallol.

Preparation

Liquor Chromii Trioxidi, B.P.C.—(Liq. Chrom. Triox.)—Solution of Chromium Trioxide. *Syn.*—Liquor Acidi Chromici. Chromium trioxide, 25 per cent. w/v, in distilled water.

This solution was included in the British Pharmacopœia, 1914, *under the name of Liquor Acidi Chromici.*

CHRYSAROBINUM
(Chrysarob.)
Chrysarobin

Chrysarobin is a mixture of substances obtained from araroba by extraction with hot benzene, the filtered solution being evaporated and the residue reduced to powder. It occurs as a light, microcrystalline, yellow powder, without odour or taste. When heated, chrysarobin melts at about 155° to 165°, evolving yellowish fumes at higher temperatures. It is soluble in hot sodium hydroxide solution giving a dark, brownish-red solution which shows a green fluorescence when largely diluted with water. When chrysarobin is shaken with dilute solution of ammonia mixed with twice its volume of water, a pink colouration slowly develops and can be seen on filtering the mixture. An evanescent violet colouration is produced when a trace of chrysarobin is mixed with 1 drop of fuming nitric acid and 1 drop of dilute solution of ammonia added. Chrysarobin contains chrysophanolanthranol, $C_{15}H_{12}O_3$, the monomethyl ether of dihydroemodinanthranol, chrysophanic (chrysophanic acid), emodin monomethyl ether and other substances of analogous composition.

Almost **insoluble** in water; slightly soluble in alcohol (90 per cent.); soluble in hot chloroform, hot benzene, and in fats.

Standard, B.P.—Chrysarobin leaves not more than 0·5 per cent. of ash.

Action and Uses.—Chrysarobin has been given internally in psoriasis and some other chronic skin diseases, but since it is liable to give rise to gastro-enteritis it is now rarely employed. **Externally,** it is used in the treatment of psoriasis and ringworm of the scalp and glabrous skin. For this purpose Pigmentum Chrysarobini and Unguentum Chrysarobini are suitable preparations. The pigment has the advantage of not staining linen. The ointment should not be applied over a large area of skin and sometimes it is advisable to use it in a diluted form. Stains caused by chrysarobin may be readily removed by solution of chlorinated lime. Ointment of lead oleate has been suggested as a suitable base for the preparation of an ointment. When absorbed into the system, chrysarobin is excreted in the urine in the form of a yellow pigment which changes to red on the addition of an alkali.

Preparations

Pigmentum Chrysarobini, B.P.C.—(Pig. Chrysarob.)—Chrysarobin Paint. Chrysarobin, 1 in 10, in solution of gutta percha.

Unguentum Chrysarobini, B.P.—(Ung. Chrysarob.)—Ointment of Chrysarobin. *Syn.*—Chrysarobin Ointment. Chrysarobin, 4 per cent., in simple ointment.

Unguentum Chrysarobini Compositum, B.P.C.—(Ung. Chrysarob. Co.)—Compound Chrysarobin Ointment. Chrysarobin and ichthammol, of each 5 per cent., and salicylic acid, 2 per cent., in yellow soft paraffin.

CIMICIFUGA
(Cimicif.)

Cimicifuga

Synonyms—Actææ Racemosæ Radix; Black Snakeroot; Black Cohosh.

Cimicifuga consists of the dried rhizome and roots of *Cimicifuga racemosa* Nutt. (Fam. Ranunculaceæ) growing in Canada and the United States of America. It is collected in the autumn.

The drug is dark brown in colour and consists of a hard, horizontal, sub-cylindrical rhizome, about 1 to 2 centimetres in diameter and 5 to 15 centimetres long. It bears several stout, ascending branches which are marked with encircling leaf-scars, and terminate either in the remains of a bud or in a circular cup-shaped scar. To the under surface are attached stout, brittle roots, often broken off short, or represented by circular scars about 2 or 3 millimetres in diameter. The transversely cut surface of the rhizome shows a thin, dark, horny bark, separated by a distinct cambium line from the wood, which consists of a ring of numerous, thin, pale wedges, separated by broad, darker medullary rays, and the centre is occupied by a large dark pith; the cells of the bark, medullary rays and pith contain starch. The roots show from three to six paler wedges of wood united by their apices and separated by broad, darker medullary rays. The drug is without odour, but the taste is bitter and acrid.

Cimicifuga **contains** a large amount of resin, *iso*ferulic acid, a trace of salicylic acid, a phytosterol, palmitic acid, and three crystalline bodies which are apparently alcohols. It yields to alcohol (60 per cent) about 22 per cent. of extractive. Cimicifugin is the name given to a resinous product obtained by pouring a strong tincture of cimicifuga into water.

Standard.—Cimicifuga contains not more than 2 per cent. of stems or other foreign organic matter. Acid-insoluble ash, not more than 4 per cent.

Cimicifuga, in powder (Pulvis Cimicifugæ : Pulv. Cimicif.), contains the constituents of Cimicifuga, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Cimicifuga is used as a bitter, and as a mild expectorant in bronchial catarrh. It has been given in chorea and rheumatic affections, in various forms of neuralgia and for its supposed action in various uterine disorders. It is **administered** in the form of a liquid extract (Extractum Cimicifugæ Liquidum, 1 in 1; dose, 5 to 30 minims) and also as the tincture.

Dose.– 0·5 to 1 gramme (8 to 15 grains).

Preparation

Tinctura Cimicifugæ, B.P.C.—(Tinct. Cimicif.)—Tincture of Cimicifuga. *Syn.*—Tincture of Actæa Racemosa. 1 in 10. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

CINCHONA
(Cinchon.)
Cinchona

Synonyms—Cinchonæ Rubræ Cortex; Red Cinchona Bark; Jesuit's Bark; Peruvian Bark.

Cinchona is the dried bark of cultivated trees of *Cinchona Calisaya* Wedd., *C. Ledgeriana* Moens, *C. officinalis* Linn., *C. succirubra* Pav., or of hybrids of either of the last two species with either of the first two (Fam. Rubiaceæ). The numerous species of *Cinchona* are indigenous to South America; they are cultivated in Java, Ceylon, India, Tanganyika and other places, the bark being exported chiefly from Java. The methods most commonly used for the collection of cinchona are two, namely, "uprooting" and "coppicing." The bark is dried either in the sun or by artificial heat.

The stem bark occurs in quilled or curved pieces, of various sizes, up to 30 centimetres or more long, from about 1 to 8 centimetres in width or diameter and usually about 2 to 6 millimetres thick. The outer surface is dull brownish-grey or grey and frequently bears lichens and mosses; it is usually rough, being marked with transverse fissures, which vary in type according to the species and are often numerous, while longitudinally it is either furrowed or wrinkled and fissured; exfoliation of the outer bark occurs in some varieties. The inner surface is striated and varies in colour, according to the species, from pale yellowish-brown to deep reddish-brown. The fracture is short in the external layers and fibrous in the inner layers. The root bark occurs in pieces about 2 to 7 centimetres long, irregularly channelled, curved or twisted. Externally, the pieces show conchoidal depressions and are often scaly; the inner surface is more or less striated and of the same colour as the outer surface, both surfaces resembling in colour that of the inner surface of the stem bark; the fracture is fibrous. The drug has a slight, characteristic odour and an intensely bitter and somewhat astringent taste.

The diagnostic **microscopical** characters are the thin-walled cork cells; the numerous isolated, yellowish, spindle-shaped, striated phloem fibres up to 90 microns in diameter, with conspicuous, somewhat funnel-shaped pits; the small number of starch grains, about 6 to 10 microns in diameter, from the parenchyma; the parenchymatous idioblasts filled with microcrystals of calcium oxalate; the only occasional stone cells.

Cinchona **contains** about twenty alkaloids in varying proportions, of which quinine, cinchonidine, cinchonine and quinidine are the most important and abundant. The percentage of total alkaloids usually ranges from about 5 to 10. In addition to the alkaloids, cinchona contains a glycoside, quinovin, cinchona red, cinchotannic, quinovic, quinic and oxalic acids, starch, colouring matters, wax and fat.

Varieties.—Red cinchona is the bark of *Cinchona succirubra* Pav.; the outer surface is more or less strongly wrinkled longitudinally, older pieces also bearing reddish warts, and the inner surface has a characteristic red-brown colour; the bark is somewhat spongy in texture. It yields about 6 to 9 per cent. of total alkaloid, 1·5 to 3·5 per cent. being quinine. Yellow cinchona is the bark of *Cinchona Calisaya* Wedd.; the outer surface has a periderm which tends to exfoliate, is marked with longitudinal furrows and shows, at distances 6 to 12 millimetres apart, transverse cracks extending entirely across the quills; the inner surface is hard and yellowish-brown in colour. It yields about 6 to 7 per cent. of alkaloid, 3 to 4 per cent. being quinine. Ledger bark is obtained from *Cinchona Ledgeriana* Moens, which is stated to be a hybrid between *C. Micrantha* Ruiz et Pav. and *C. Calisaya*. This bark closely resembles that of *C. Calisaya*, but usually contains a higher proportion of quinine, up to 10 or even 14 per cent. Pale cinchona is the bark of *Cinchona officinalis* Linn. and is distinguished by the small size of the quills, which do not usually exceed about 12 millimetres in diameter, and by the presence on the outer surface of numerous small transverse cracks, the edges of which are recurved. It yields about 6 per cent. of total alkaloid, about one half of which is quinine. Hybrid bark is usually a hybrid between *C. Ledgeriana* and *C. succirubra;* it shows characters intermediate between those of the two cinchonas of which it is a hybrid. It yields a high percentage of quinine.

Substitutes.—Colombian bark, from *Cinchona lancifolia* Mutis, occurs usually in flat or curved pieces about 15 to 50 centimetres long, 4 to 8 centimetres wide, and 2 to 10 millimetres thick. It is reddish-brown in colour and spongy in texture; it bears on the outer surface characteristic patches of silvery cork. Cuprea bark is the bark of *Remijia pedunculata* Flueck (Fam. Rubiaceæ). It is coppery-red, in rather small pieces, 3 to 6 millimetres thick, very hard, with a granular and splintery fracture. It contains about 2 or 3 per cent of quinine. The bark of *R. Purdieana* Wedd. contains a number of alkaloids amongst which are cinchonine and cinchonidine, but quinine is absent. Naranjada bark from Bolivia is obtained from *Cinchona ovata* Ruiz et Pav. and other species. This bark occurs in flats or large quills of considerable thickness, up to 1 centimetre; the external surface is golden-yellow; it contains about 5 per cent. of total alkaloid, but only a trace of quinine.

Standard, B.P.—Cinchona contains not less than 6 per cent. of the alkaloids of cinchona, of which not less than one half consists of quinine and cinchonidine. It contains not more than 2 per cent. of foreign organic matter. Ash, not more than 4 per cent.

Cinchona, in powder (Pulvis Cinchonæ : Pulv. Cinchon.), contains the constituents and possesses the diagnostic microscopical characters of Cinchona, and complies with the limits for alkaloids and ash of the unground drug.

Action and Uses.—Cinchona is a bitter tonic and stomachic. It has the action of quinine, but is also astringent, more irritating to the stomach and intestines and more slowly absorbed. It occasionally causes vomiting and, if taken in large doses over a prolonged period, may produce symptoms of cinchonism. The liquid extract is used as a tonic for convalescents, with hydrobromic acid and tincture of nux vomica, and is employed in dipsomania. The compound tincture in large doses is employed as a prophylactic for the common cold, and with syrup of codeine phosphate it is used for the relief of persistent coughs. Cinchona is a useful astringent for the throat, and the decoction or acid infusion is used in gargles. The powdered bark is occasionally used as an ingredient of astringent tooth powders. Liquid preparations of cinchona are best administered in acid media,

which keep the alkaloids in solution. Decoction of cinchona and the tinctures are, however, frequently prescribed with ammonium carbonate, which precipitates the alkaloids, so that they sometimes require to be suspended with syrup or mucilage of acacia. Preparations of cinchona are **incompatible** with salicylates and iodides.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Decoctum Cinchonæ Concentratum, B.P.C.—(Dec. Cinchon. Conc.)—Concentrated Decoction of Cinchona. 1 in 2. When decoction of cinchona or Decoctum Cinchonæ is prescribed, this concentrated decoction diluted with seven times its volume of distilled water may be dispensed. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Elixir Cinchonæ, B.P.C.—(Elix. Cinchon.)—Elixir of Cinchona. Tincture of cinchona, about 1 in 6½, with syrup, glycerin and aromatic elixir. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Extractum Cinchonæ, B.P.—(Ext. Cinchon.)—Extract of Cinchona. A soft extract prepared with alcohol (90 per cent.) and adjusted with glycerin to contain 10 per cent. of the alkaloids of cinchona (limits, 9·5 to 10·5); 0·5 gramme contains about 0·05 gramme, and 8 grains contains about ½ grain, of alkaloids. It should be stored in small, wide-mouthed, well-closed containers in a cool place. Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

Extractum Cinchonæ Liquidum, B.P.—(Ext. Cinchon. Liq.)—Liquid Extract of Cinchona. It contains 5 per cent. w/v of the alkaloids of cinchona in hydrochloric acid solution with glycerin and alcohol (limits, 4·75 to 5·25); 1 millilitre contains about 0·05 gramme and 15 minims contains about ¾ grain. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Infusum Cinchonæ Acidum Concentratum, B.P.C.—(Inf. Cinchon. Acid. Conc.)—Concentrated Acid Infusion of Cinchona. 1 in 2½. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh acid infusion of cinchona and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Infusum Cinchonæ Acidum Recens, B.P.C.—(Inf. Cinchon. Acid. Rec.)—Fresh Acid Infusion of Cinchona. Cinchona, 1 in 20, and aromatic sulphuric acid, 1 in 80. When acid infusion of cinchona or Infusum Cinchonæ Acidum is prescribed, fresh infusion not being specified, either Infusum Cinchonæ Acidum Recens, or Infusum Cinchonæ Acidum Concentratum suitably diluted, may be dispensed. Dose.–15 to 30 millilitres (½ to 1 fluid ounce).

This infusion was included in the British Pharmacopœia, 1914, under the name of Infusum Cinchonæ Acidum.

Tinctura Cinchonæ, B.P.—(Tinct. Cinchon.)—Tincture of Cinchona. Extract of cinchona, 10 per cent. w/v, in alcohol (70 per cent.). It contains 1 per cent. w/v of the alkaloids of cinchona (limits, 0·95 to 1·05); 4 millilitres contains 0·04 gramme, and 1 fluid drachm contains about ⅛ grain, of alkaloids. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tinctura Cinchonæ Composita, B.P.—(Tinct. Cinchon. Co.)—Compound Tincture of Cinchona. Extract of cinchona, 5 per cent. w/v, dissolved in the liquid obtained by percolating dried bitter-orange peel, serpentary and cochineal with alcohol (70 per cent.). It contains 0·5 per cent. w/v of the alkaloids of cinchona (limits, 0·475 to 0·525); 4 millilitres contains 0·02 gramme, and 1 fluid drachm contains about ¼ grain, of alkaloids. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

CINCHONIDINÆ SULPHAS
(Cinchonidin. Sulph.)
Cinchonidine Sulphate
$(C_{19}H_{22}ON_2)_2,H_2SO_4,7H_2O = 812{\cdot}6$

Cinchonidine sulphate is the sulphate of a base present in cinchona bark. It occurs in the form of colourless, shining, silky crystals, neutral to litmus, without odour, but with a strong, bitter taste. When anhydrous it melts at about 207°.

Soluble in water (1 in 100), more readily on the addition of dilute acid, and in alcohol (1 in 60); almost insoluble in ether and chloroform.

Standard.—Cinchonidine sulphate loses, on drying at 100°, not more than 16 per cent. of its weight. Ash, not more than 0·1 per cent. A solution obtained by dissolving 0·25 gramme in 5 millilitres of sulphuric acid is not coloured more than pale yellow (limit of readily carbonisable substances). A solution (1 in 1000) in dilute sulphuric acid is not more than faintly fluorescent (limit of quinine and quinidine). When 0·5 gramme is shaken with 20 millilitres of water at 15° for some time, 0·5 gramme of sodium potassium tartrate added, and the mixture left with frequent shaking for one hour and then filtered, the filtrate is rendered not more than faintly opalescent on the addition of a drop of dilute solution of ammonia (limit of cinchonine and quinidine).

Action and Uses.—Cinchonidine has much the same action as quinine, but it increases reflexes, and in large doses gives rise to well-marked epileptiform convulsions. It has been observed that even small doses administered to epileptics may increase the frequency of attacks. Cinchonidine, in common with the other crystallisable alkaloids of cinchona bark, has the action of a general protoplasmic poison, being especially toxic to protozoa such as the malaria parasite. Cinchonidine salts are somewhat less efficacious in the treatment of malaria than are salts of the other crystallisable cinchona alkaloids. Cinchonidine sulphate is useful in the treatment of rheumatism and neuralgia in frequently repeated doses of 0·3 gramme (5 grains). It is usually **administered** with dilute sulphuric acid, as in the case of quinine sulphate, to facilitate solution. Pills may be prepared with liquid glucose or glycerin of tragacanth.

Dose.– 0·06 to 0·6 gramme (1 to 10 grains).

CINCHONIDINA.—Cinchonidine, $C_{19}H_{22}ON_2$, occurs as short, colourless prisms or thin plates, soluble in 16 parts of alcohol (95 per cent.), and is lævorotatory.

CINCHONIDINÆ SALICYLAS.—Cinchonidine salicylate, $C_{19}H_{22}ON_2,C_6H_4(OH)COOH$, occurs as a crystalline powder, sparingly soluble in water, but soluble in alcohol. It is specially indicated in acute muscular rheumatism and sciatica, and is given in similar doses to the sulphate. It is useful as a prophylactic against influenza in doses of 0·3 gramme (5 grains) twice daily, and in the treatment of influenza, when it may be given in doses of 0·6 to 1 gramme (10 to 15 grains).

CINCHONIDINÆ DIHYDROCHLORIDUM.—Cinchonidine dihydrochloride, cinchonidine acid hydrochloride, $C_{19}H_{22}ON_2,2HCl$, occurs as a white powder. It is readily soluble in water and has been used in the preparation of solutions for intramuscular injection in doses up to 0·5 gramme (8 grains). Solutions for injection may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

CINCHONINÆ HYDROCHLORIDUM

(Cinchonin. Hydrochlor.)

Cinchonine Hydrochloride

$C_{19}H_{22}ON_2,HCl,2H_2O = 366{\cdot}7$

Cinchonine hydrochloride is the hydrochloride of a base present in cinchona bark. It occurs in white, microcrystalline flakes or needles, without odour, but with a bitter taste. It has occasionally been found as an adulterant in quinine sulphate. Its solution is not rendered fluorescent by the addition of sulphuric acid and a dilute neutral solution is not precipitated by sodium potassium tartrate solution.

Soluble in water (1 in 20), alcohol (1 in 2), and ether (1 in 300).

Standard.—Cinchonine hydrochloride loses, on drying at 100°, not more than 10 per cent of its weight. Ash, not more than 0·1 per cent. 1 gramme dissolves completely in 25 millilitres of chloroform. 0·05 gramme dissolved in 1 millilitre of sulphuric acid produces not more than a pale yellow colour (limit of readily carbonisable substances). 10 millilitres of a 1 per cent. solution gives a white precipitate on the addition of 1 millilitre of dilute solution of ammonia, which does not dissolve completely on shaking with 20 millilitres of ether (limit of quinine, quinidine and cinchonidine).

Action and Uses.—Cinchonine is a bitter tonic and antiperiodic; like cinchonidine it differs in its action from quinine, increasing reflexes and, in very large doses, even causing convulsions. The two dextrorotatory alkaloids, cinchonine and quinidine, have been recommended as substitutes for quinine in the treatment of patients who exhibit idiosyncrasy to the latter alkaloid. Cinchonine salts have the same toxicity when given intravenously as the corresponding quinine salts. When large doses are given subcutaneously or intramuscularly, cinchonine salts cause cinchonism owing to their rapid absorption, which is speedier and more complete than that of quinine salts. When its bitter action is not required, cinchonine hydrochloride may be **administered** in pills; they may be prepared with liquid glucose or glycerin of tragacanth.

Dose.– 0·06 to 0·6 gramme (1 to 10 grains).

CINCHONINA.—Cinchonine, $C_{19}H_{22}ON_2$, occurs as a white powder, or as white, lustrous prisms or needles, odourless and at first almost tasteless, but soon developing a bitter taste. It is almost insoluble in water (about 1 in 4000), but soluble in ether (about 1 in 500), and alcohol (about 1 in 150.).

CINCHONINÆ DIHYDROCHLORIDUM.—Cinchonine dihydrochloride, cinchonine acid hydrochloride, $C_{19}H_{22}ON_2,2HCl$, occurs as a white, odourless powder, having a very bitter taste. It is soluble in water (about 1 in 0·6), alcohol (1 in 6), and chloroform (1 in 115), and is almost insoluble in ether. Intramuscular injections of cinchonine dihydrochloride are given in relapsing cases of malaria and in the treatment of the malignant tertian variety, in doses of 0·3 to 1 gramme (5 to 15 grains). This treatment is useful in those cases in which quinine causes sickness. Owing to its greater solubility, the dihydrochloride is more suitable

for this purpose than the hydrochloride Solutions for injection may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

CINCHONINÆ SULPHAS. Cinchonine sulphate, $(C_{19}H_{22}ON_2)_2,H_2SO_4,2H_2O$, occurs in small, hard, white, vitreous, prismatic crystals, odourless, and with a very bitter taste. It is soluble in water (about 1 in 70), and alcohol (1 in 10), and is almost insoluble in ether.

CINCHOPHENUM

(Cinchophen.)

Cinchophen

$C_{16}H_{11}O_2N = 249{\cdot}1$

Synonym—Quinophan.

Cinchophen is 2-phenylquinoline-4-carboxylic acid, $C_6H_5{\cdot}C_9H_5N{\cdot}COOH$, and may be prepared by the interaction of pyruvic acid and benzylidene-aniline in the presence of alcohol. It occurs as an odourless, white or cream-coloured powder, or in acicular crystals, and has a slightly bitter taste. The ammoniacal solution when evaporated to small bulk and diluted with water gives a white precipitate with silver nitrate solution, a yellowish precipitate with lead acetate solution and a green precipitate with copper sulphate solution.

Insoluble in water; soluble in alcohol (95 per cent.) (about 1 in 120), ether (about 1 in 100), chloroform (about 1 in 400), and in solutions of alkali hydroxides, carbonates and bicarbonates.

Standard, B.P.—Cinchophen contains not less than 99 per cent. of $C_{16}H_{11}O_2N$, calculated on the dry substance. Loss on drying in a vacuum desiccator over sulphuric acid, not more than 1 per cent. Melting-point, 214° to 217°. Ash, not more than 0·2 per cent. It complies also with a test for absence of soluble acids and with a limit test for readily carbonisable substances.

Action and Uses.—Cinchophen is employed to increase the rate of excretion of uric acid; it appears to assist excretion and not to increase formation since, after its administration, the percentage of uric acid in the blood is definitely diminished. Deposits of urates thus tend to pass into solution. In other respects it exerts an action very similar to that of quinine. Cinchophen is indicated chiefly in acute gout; in non-uratic joint affections its value is doubtful. Care must be taken in the use of this substance since it sometimes has a toxic action on the liver, causing acute yellow atrophy. Toxic effects, such as loss of appetite, nausea, vomiting and jaundice, may easily occur and any one of these should be regarded as an indication for discontinuing the drug. The patient should be under constant observation during treatment. It is best **administered** in tablets, the dose being taken with a large volume of water and 30 to 75 grains of sodium bicarbonate. It is usually given in doses of 0·5 gramme (8 grains), two or three times a day, for three consecutive days; an interval of four days should elapse before treatment is resumed.

Since some patients show an idiosyncrasy, a small preliminary dose should be given before commencing a course of treatment. In order to minimise the possibility of liver damage, it is recommended that dextrose and calcium lactate should be given concurrently with cinchophen.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

NEOCINCHOPHENUM.—Neocinchophen, neoquinophan, $CH_3\ C_9H_4N{\cdot}C_6H_5\ COOC_2H_5$, is the ethyl ester of 6-methyl-2-phenylquinoline-4-carboxylic acid. It occurs as a slightly yellow, colourless and tasteless powder, which melts at about 76°. It is readily soluble in strong acids and hot alcohol, but insoluble in water and dilute alkalis. Neocinchophen resembles cinchophen in its action and is administered in tablets, with the precautions outlined under cinchophen. Dose.– 0·3 to 1 gramme (5 to 15 grains).

CINNAMOMUM
(Cinnam.)
Cinnamon

Synonyms—Cinnamomi Cortex; Cinnamon Bark.

Cinnamon consists of the dried inner bark of the shoots of coppiced trees of *Cinnamomum zeylanicum* Nees (Fam. Lauraceæ), a small tree indigenous to and cultivated in Ceylon. It is known in commerce as Ceylon cinnamon. The trees are cut down to form stools from which adventitious shoots arise; these are cut off when about one or two metres in length, the bark is stripped and the epidermis and cortex removed by scraping; the strips are then packed inside one another and dried.

Cinnamon occurs in single or double, closely-packed, compound quills up to about 2 metres in length and about 1 centimetre in diameter. The external surface is dull, yellowish-brown and marked with pale, wavy, longitudinal lines and often with small scars or holes; only rarely do patches of cork occur. The inner surface is darker and marked with faint longitudinal striations. Each quill is about 0·5 millimetre in thickness and is very brittle, breaking with a splintery fracture. The bark has a fragrant odour and a warm, sweet, aromatic taste.

The diagnostic **microscopical** characters are the sclerenchymatous cells of the phelloderm, isodiametric or slightly elongated tangentially, the inner and radial walls often being thicker than the outer, some containing starch grains; the medullary rays, mostly 2 cells wide; the presence in some cells of the medullary rays and of the phloem parenchyma of acicular microcrystals of calcium oxalate; the strongly-thickened phloem fibres, usually under 30 microns in diameter, either isolated or in short tangential rows; the axially elongated secretory cells of the secondary phloem, containing volatile oil or mucilage; the starch grains, either simple or compound, individual grains mostly under 10 microns in diameter; the absence of wood vessels and of all but traces of cork.

Cinnamon **contains** about 1 to 2 per cent. of volatile oil, with tannin and mucilage. It yields to alcohol (90 per cent.) from about 14 to 16 per cent. of extractive.

Substitutes and Adulterants.—Jungle cinnamon is obtained from wild plants; the bark is darker, coarser, less carefully trimmed and less aromatic than the cultivated bark. Saigon cinnamon is referred to *Cinnamomum Loureirii* Nees; the quills are thicker than those of Ceylon cinnamon and of a greyish or greyish-brown colour with lighter patches, warty and ridged externally, and have a sweeter taste. Java cinnamon is obtained from *Cinnamomum Burmanni* Blume. It may be distinguished by its low yield of extractive to alcohol (90 per cent.) and, microscopically, by the presence in the medullary rays of small tabular crystals of calcium oxalate. The odour is less delicate than that of Ceylon cinnamon. Seychelles cinnamon is said to be obtained from plants of *Cinnamomum zeylanicum* Nees introduced into the Seychelles, where they have become wild. It yields about 14 per cent. of extractive to alcohol (90 per cent.) and the stone cells are usually large. Cinnamon chips consist of small pieces of untrimmed bark; it can be distinguished by its lower yield to alcohol (90 per cent.) and, microscopically, by the abundance of cork. A similar material to "chips", but of a slightly better quality, is known as "featherings."

Standard, B.P.—Cinnamon yields not more than 7 per cent. of ash. Acid-insoluble ash, not more than 2 per cent.

Cinnamon, in powder (Pulvis Cinnamomi : Pulv. Cinnam.), contains the constituents and possesses the diagnostic microscopical characters of Cinnamomum, and complies with the standard for the unground drug.

Action and Uses.—Cinnamon is carminative and antiseptic by virtue of its volatile oil, and slightly astringent owing to the tannin it contains. For use in diarrhœa, as an intestinal astringent and stimulant, the powder (as in Pulvis Cinnamomi Compositus or Pulvis Cretæ Aromaticus) or Tinctura Cinnamomi is preferred. Aqua Cinnamomi is a useful aromatic vehicle.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

Preparations

Aqua Cinnamomi Concentrata, B.P.—(Aq. Cinnam. Conc.)—Concentrated Cinnamon Water. Oil of cinnamon, 1 in 50. One part added to 39 parts of distilled water yields a preparation which is approximately equivalent in strength to distilled cinnamon water, but contains 1·5 per cent. v/v of alcohol (90 per cent.). Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This concentrated water was included in the British Pharmaceutical Codex, 1923.

Aqua Cinnamomi Destillata, B.P.—(Aq. Cinnam. Dest.)—Distilled Cinnamon Water. Cinnamon, 1 in 10. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Pulvis Cinnamomi Compositus, B.P.C.—(Pulv. Cinnam. Co.)—Compound Cinnamon Powder. *Syn.*—Pulvis Aromaticus. Equal parts of cinnamon, cardamom and ginger. Dose.– 0·6 to 4 grammes (10 to 60 grains).

This powder was included in the British Pharmacopœia, 1914.

Tinctura Cinnamomi, B.P.C.—(Tinct. Cinnam.)—Tincture of Cinnamon. 1 in 5. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

Tinctura Cinnamomi Composita, B.P.C.—(Tinct. Cinnam. Co.)—Compound Tincture of Cinnamon. Cinnamon, 1 in 40, with cardamom, long pepper and ginger. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

COCA
(Coca)
Coca

Synonyms—Cocæ Folia; Coca Leaves.

Coca consists of the dried leaves of *Erythroxylum coca* Lam. (Bolivian or Huanuco leaf) or of *E. truxillense* Rusby (Peruvian or Truxillo leaf) (Fam. Erythroxylaceæ), shrubs indigenous to Bolivia and Peru and cultivated in Java. It should be **stored** in a dry place to prevent hydrolysis of the alkaloid following upon attack by mildew.

The leaves of Bolivian coca are shortly petiolate, elliptical, from 3·5 to 7 centimetres long and from 2·5 to 3·5 centimetres wide, and glabrous; the apex is acute and mucronate, the projecting tip being frequently broken off; the margin is entire, the veinlets prominent on the upper surface, the midrib depressed and surmounted by a raised ridge; on the under surface of the leaf a curved line runs from the base to the apex on either side of the midrib; the leaves are thin but not fragile and are usually unbroken. The leaves of Peruvian coca have the same general characters as the above, but may be distinguished by their smaller size, pale green colour, papery texture, less distinct curved lines and less marked ridges above the midrib and by their broken condition. They were formerly mixed with flowers of a species of *Inga*, an intentional addition made with the object of improving the drug. The odour of both varieties is faint, and the taste is bitter, followed by a sensation of numbness of the tongue.

The diagnostic **microscopical** characters are the papillose cells of the under epidermis; the stomata on the under surface only, accompanied by two cells with their long axes parallel to the ostiole; the prismatic crystals of calcium oxalate in the cortical tissue and in certain cells of the palisade tissue; the absence of hairs.

Coca **contains** the alkaloids, cocaine (methylbenzoylecgonine), cinnamyl-cocaine (methylcinnamylecgonine), and α- and β-truxillines (isatropyl-cocaine and methyl-β-truxillylecgonine). The amount of total alkaloid yielded by the commercial leaves varies from about 0·5 to 1·5 per cent. Coca is now frequently valued by its ecgonine content, since much of the cocaine of commerce is synthesised from ecgonine. As a rule, Truxillo and Java leaf contains more alkaloid than Bolivian, but only about one-half of it is cocaine, whereas from 70 to 80 per cent. of the total alkaloid in Bolivian leaf consists of cocaine. Coca also contains cocatannic acid. Coca leaf from Java, said to be derived from *E. truxillense* Rusby, yields from 1 to 2 per cent. of total alkaloid, part of which is benzoylpseudotropine or tropacocaine, and four yellow, crystalline glycosides.

Action and Uses.—Coca has virtually the same action as that of cocaine, although preparations of the drug appear rather more stimulating and possess a mild astringency. In Peru and Bolivia, coca leaf is chewed for its effect in relieving hunger and fatigue. The leaf

has been used as a cerebral and muscle stimulant, especially during convalescence; it relieves gastric pain, nausea and vomiting. Coca is usually administered in the form of elixir and liquid extract. In cases of **poisoning** by preparations of coca, the antidotes described under Cocaina should be employed.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

ERYTHROPHLŒUM.—Erythrophlœum, or sassy bark, is the bark of the trunk and branches of *Erythrophlœum guineense* G. Don (Fam. Leguminosæ), a large tree indigenous to the Guinea Coast of Africa and to the neighbourhood of the Congo, and widely, but sparsely, distributed throughout a great part of Africa. The bark occurs in quills about 1·5 centimetres in diameter or in hard, heavy, curved or flat pieces, often from about 7·5 to 10 centimetres long, 5 to 7·5 centimetres wide, and 5 to 9 millimetres thick. The outer surface is warty and irregular, and of a dark reddish colour, often exhibiting, in the older pieces, large conchoidal depressions. The inner surface is longitudinally striated, and is of a dark reddish-brown or nearly black colour; the fracture is short and granular; the smoothed, transversely cut surface exhibits a narrow, brown cork and a narrow and darker cortex separated from the phloem by a pale line of sclerenchymatous cells; the phloem contains numerous large, paler groups of sclerenchymatous cells embedded in a reddish-brown parenchymatous tissue. The drug has no odour, and only a slightly bitter, astringent taste. Erythrophlœum contains a poisonous alkaloid, erythrophlœine, which resembles digitalis in its pharmacological properties and has been used as an anæsthetic in dentistry. A 50 per cent. solution of the sulphate in eugenol has been used as an obtundent.

Preparations

Elixir Cocæ, B.P.C.—(Elix. Cocæ)—Elixir of Coca. Liquid extract of coca, about 1 in 6, in simple elixir. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Cocæ Liquidum, B.P.C.—(Ext. Cocæ Liq.)—Liquid Extract of Coca. *Syn.*—Miscible Liquid Extract of Coca. This liquid extract contains from 0·45 to 0·55 per cent. w/v of ether-soluble alkaloids calculated as cocaine; 4 millilitres contains about 0·02 gramme, and 1 fluid drachm contains about ⅓ grain, of alkaloids. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

COCAINA
(Cocain.)

Cocaine

$$C_{17}H_{21}O_4N = 303{\cdot}2$$

Cocaine is methylbenzoylecgonine and occurs, together with varying proportions of other alkaloids of closely related structure, in a number of species of *Erythroxylum*. The total alkaloids are obtained from the leaves by admixture with lime and subsequent percolation with naphtha or other similar solvent. From the crude mixture of alkaloids thus obtained, cocaine is prepared either directly, by suitable methods of purification, or by acid hydrolysis of the crude product, whereby the various alkaloids are broken down to ecgonine. This is isolated and purified, and on methylation and benzoylation gives cocaine. The greater part of the cocaine of commerce is now prepared from Java leaves by the latter procedure.

Cocaine occurs in colourless, odourless crystals, having a bitter taste followed by a sensation of tingling and numbness of the tongue. It is readily soluble in acids, giving salts which are lævorotatory in solution. When heated at 100° for five minutes with sulphuric acid mixed with twice its volume of water, methyl benzoate is formed, together with benzoic acid which separates on allowing the liquid to stand for a few hours. When a trace of cocaine is dissolved in the minimum quantity of N/10 hydrochloric acid, a few millilitres of solution of alum added, followed by 3 or 4 millilitres of N/10 potassium permanganate solution, violet, rectangular plates separate after stirring the mixture briskly for a few seconds.

Very slightly **soluble** in water (about 1 in 1300); more soluble in alcohol (90 per cent.) (1 in 10), ether (1 in 4), chloroform (2 in 1), oleic acid (1 in 4), olive oil (1 in 24), castor oil (1 in 10), liquid paraffin or soft paraffin (1 in about 120), oil of turpentine (1 in 14), warm anhydrous lanolin (1 in 2) and benzene (1 in 3); also soluble in toluene, amyl alcohol and light petroleum, but insoluble in glycerin.

Standard, B.P.—Cocaine has a melting-point of 97° to 98°. Ash, not more than 0·1 per cent. It complies also with a test for absence of isatropyl-cocaine, and with limit tests for readily carbonisable substances, and for reducing substances and cinnamyl-cocaine.

Action and Uses.—Cocaine is a powerful local anæsthetic. Mucous surfaces are rendered insensible by simple application of the drug. Hypodermic injection results in a cutaneous anæsthesia; 1·2 millilitres (20 minims) of a 2 per cent. w/v solution of a cocaine salt produces local anæsthesia in from five to twenty minutes, lasting for about twenty minutes. It is used as a local anæsthetic prior to tooth extraction, injection being necessary to reach the dental nerves. In many cases it is injected with adrenaline, the latter localising the action of the cocaine by its vasoconstrictor effect. It is an effective spinal anæsthetic, but is too dangerous to justify its use for that purpose. Cocaine has an important place in ophthalmic surgery owing to its certainty of action, and also to its action in blanching the conjunctiva and dilating the pupil. These points are responsible for its superiority over the numerous substitutes that have to some extent replaced it for use in other regions of the body. Soon after absorption, cocaine causes a sense of exhilaration and well-being, due to stimulation of the cerebral cortex. There is also an increased power to work and overcome fatigue. Large doses cause restlessness, tremors and hallucinations. Some people have a distinct cocaine idiosyncrasy and may become dangerously ill after quite small doses; the symptoms are headache, faintness and collapse, and may occur with alarming rapidity.

The prolonged use of cocaine may result in the formation of a habit; cocaine addicts inject it hypodermically or use it in the form of a snuff. The addict suffers from sleeplessness, loss of memory and an intolerable craving for the drug; loss of weight is usually marked, and the person undergoes mental deterioration, relapsing ultimately into a state of permanent moral degeneracy with lack of social responsibility.

When used as a snuff, the action of cocaine is very rapid, a state of exhilaration or irresponsibility, according to the individual, being rapidly reached.

Cocaine is used chiefly in the form of its salts, such as the hydrochloride, nitrate and salicylate, but the alkaloid may be used in combination with fatty or oily bases, as in suppositories, ointments and oily spray-solutions. Cocaine ointment relieves pruritus and the irritation of urticaria or eczema, and the pain of hæmorrhoids and facial neuralgia. Unguentum Cocainæ is not suitable for ophthalmic use, for which purpose Oculentum Cocainæ should be employed. Spray-solutions are used in hay fever, asthma, pharyngitis and laryngitis; they may be oily solutions of the pure alkaloid or aqueous solutions of its salts. Liquid paraffin will retain less than 1 per cent. w/v of cocaine in permanent solution. Stronger solutions (2 to 5 per cent. w/v) may be prepared with almond oil or a mixture of almond oil and liquid paraffin. For external application to chilblains, a 2 per cent. w/v solution of cocaine in collodion may be used. For toothache, a 5 to 10 per cent. w/v solution in oil of clove has been used. A very moderate heat should be used in the preparation of oily solutions of cocaine. Solutions in oils and fats are less active than aqueous solutions of cocaine salts. In cases of **poisoning** by cocaine, strong coffee should be given by the mouth or rectum, and the usual means adopted to combat shock or cardiac failure.

Dose.– 0·008 to 0·016 gramme ($\frac{1}{8}$ to $\frac{1}{4}$ grain).

Preparations

Buginaria Cocainæ, B.P.C.—(Bugin. Cocain.)—Cocaine Urethral Bougies. Each bougie contains $\frac{1}{2}$ grain of cocaine.

Guttæ Cocainæ, B.P.C.—(Gutt. Cocain.)—Cocaine Eye Drops. *Syn.*—Factory Eye Drops. Cocaine, 1 in 200, with mercuric chloride, in castor oil.

Nebula Cocainæ Composita, B.P.C.—(Neb. Cocain. Co.)—Compound Cocaine Spray. Cocaine, 0·5 per cent. w/v, in compound menthol and thymol spray.

Unguentum Cocainæ, B.P.C.—(Ung. Cocain.)—Cocaine Ointment. Cocaine, 4 per cent., in oleic acid and lard.

This ointment was included in the British Pharmacopœia, 1914.

COCAINÆ HYDROCHLORIDUM

(Cocain. Hydrochlor.)

Cocaine Hydrochloride

$C_{17}H_{21}O_4N,HCl = 339·6$

Synonym—Cocaini hydrochloridum I.A.

Cocaine hydrochloride is the hydrochloride of the alkaloid cocaine. It occurs in colourless, odourless, transparent crystals, having a bitter taste followed by a sensation of tingling and numbness of the tongue. The aqueous solution is lævorotatory and gives the reactions of chlorides. On the addition of one or two drops of chromium trioxide

solution to a 1 per cent. solution of cocaine hydrochloride, a yellow precipitate is formed which re-dissolves on shaking; a permanent yellow precipitate is formed on adding a few more drops of the chromium trioxide solution. Cocaine hydrochloride responds to the tests with sulphuric acid and with potassium permanganate described under Cocaina.

Soluble in water (2 in 1), alcohol (90 per cent.) (1 in 3), glycerin (1 in 3) and chloroform (1 in 20); insoluble in oils and almost insoluble in ether.

Standard, B.P.—Cocaine hydrochloride, when placed in the heating bath at 193°, has a melting-point not lower than 197°. Specific rotation in 2 per cent. w/v aqueous solution, —70° to —72°. Ash, not more than 0·1 per cent. It complies with a test for absence of isatropyl-cocaine and with limit tests for acidity, readily carbonisable substances and reducing substances, and for cinnamyl-cocaine.

Action and Uses.—Cocaine hydrochloride is generally suitable for use in aqueous solutions, except for preparations containing silver or lead, when cocaine nitrate should be used. Freshly boiled and cooled distilled water must be used in the preparation of cocaine solutions, on account of their tendency to develop fungoid growths. Solutions for ophthalmic use contain from 2 to 4 per cent. Pastilles contain from 0·0015 gramme ($\frac{1}{40}$ grain) to 0·01 gramme ($\frac{1}{6}$ grain) in each, and lozenges are prepared of the same strengths for use against throat irritation and hoarseness. Solutions of cocaine hydrochloride (5 to 10 per cent. w/v) are applied locally to mucous surfaces previous to operation. For the production of deep-seated anæsthesia, local infiltration is resorted to, solution of adrenaline being commonly added to the solution to constrict the blood vessels and so reduce hæmorrhage. The local anæsthesia so produced is more prolonged than with cocaine hydrochloride only, and there is less danger of rapid absorption. Injectio Cocainæ Hypodermica of the British Pharmacopœia, 1914, contained 5 per cent. w/v of the salt and 0·15 per cent. w/v of salicylic acid in distilled water and was administered in doses of 5 to 10 minims. For infiltration anæsthesia, cocaine is largely superseded by synthetic compounds such as procaine hydrochloride. Solutions may be **sterilised** by tyndallisation or by filtration. The containers should comply with the tests for limit of alkalinity of glass. Pessaries and suppositories of cocaine are made with the hydrochloride when rapid action is required; when prolonged action is desired, they should be made with the alkaloid.

Cocaine hydrochloride is **incompatible** with borax. A clear solution is formed if equal weights of borax and boric acid are dissolved before adding the cocaine salt in solution. Cocaine hydrochloride forms an insoluble compound with mercuric chloride and should not be prescribed therewith. It is also incompatible with alkalis and alkali carbonates, phenol, tannic acid, mercuric oxide and soluble silver salts. In cases of **poisoning,** the antidotes described under Cocaina should be used.

Dose.—0·008 to 0·016 gramme ($\frac{1}{8}$ to $\frac{1}{4}$ grain).

COCAINÆ NITRAS.—Cocaine nitrate, $C_{17}H_{21}O_4N,HNO_3$, occurs in large, colourless, tabular crystals which are readily soluble in water and alcohol, and slightly soluble in ether. Cocaine nitrate is employed for the same purposes as the hydrochloride, but can be prescribed with silver nitrate, or may be applied before the silver salt, to lessen the pain caused by the latter. Dose.– 0·008 to 0·016 gramme ($\frac{1}{8}$ to $\frac{1}{4}$ grain).

COCAINÆ SALICYLAS.—Cocaine salicylate, $C_{17}H_{21}O_4N$, $C_7H_6O_3$, occurs in white, deliquescent, crystalline masses, soluble in water and alcohol. For internal use or hypodermic injection, cocaine salicylate possesses no advantage over the hydrochloride. It is sometimes used in eye lotions with sodium salicylate. Dose.– 0·008 to 0·016 gramme ($\frac{1}{8}$ to $\frac{1}{4}$ grain).

TROPACOCAINÆ HYDROCHLORIDUM.—Tropacocaine hydrochloride is the hydrochloride of benzoylpseudotropine, which is a by-product in the manufacture of cocaine, or it may be prepared synthetically. It occurs as a white, crystalline powder slightly soluble in alcohol, but readily soluble in water, giving a neutral solution; it melts at 271°. It is used as an anæsthetic in the form of a 1 to 5 per cent. solution.

Preparations

Insufflatio Mentholis et Cocainæ, B.P.C.—(Insuff. Menthol. et Cocain.)—Menthol and Cocaine Insufflation. *Syn.*—Menthol and Cocaine Snuff. Menthol, 2·5 per cent., and cocaine hydrochloride, 0·14 per cent., with ammonium chloride, camphor and lycopodium.

Lamella Cocainæ, B.P.—(Lamell. Cocain.)—Lamella of Cocaine. Each lamella contains 0·0013 gramme ($\frac{1}{50}$ grain) of cocaine hydrochloride.

Nebula Adrenalinæ et Cocainæ, B.P.C.—(Neb. Adrenal. et Cocain.)—Adrenaline and Cocaine Spray. Adrenaline, as solution of adrenaline hydrochloride, 1 in 5000, cocaine hydrochloride, 1 in 100, with chlorbutol and sodium chloride, in distilled water.

Oculentum Atropinæ et Cocainæ, B.P.C.—(Oculent. Atrop. et Cocain.)—Atropine and Cocaine Eye Ointment. Atropine sulphate, about 0·25 per cent., and cocaine hydrochloride, about 0·5 per cent., in simple eye ointment.

Oculentum Cocainæ, B.P.—(Oculent. Cocain.)—Cocaine Ointment for the Eye. Cocaine hydrochloride, 0·25 per cent., in simple eye ointment. It should be stored in small, well-closed containers in a cool place away from light.

An ointment for the eye, prepared with 2 per cent. of cocaine and white soft paraffin, was included in the British Pharmaceutical Codex, 1923.

Pastilli Mentholis et Cocainæ, B.P.C.—(Pastill. Menthol. et Cocain.)—Menthol and Cocaine Pastilles. Each pastille contains $\frac{1}{20}$ grain of menthol and $\frac{1}{40}$ grain of cocaine hydrochloride.

Solvellæ Boracis et Cocainæ Compositæ, B.P.C.—(Solv. Borac. et Cocain. Co.)—Compound Solution-Tablets of Borax and Cocaine. Each tablet contains 5 grains of sodium chloride, 3 grains of borax, 1 grain of boric acid, $\frac{1}{2}$ grain of sodium benzoate and $\frac{1}{12}$ grain of cocaine hydrochloride, with menthol, thymol and oil of sweet birch.

Suppositorium Adrenalinæ et Cocainæ, B.P.C.—(Supp. Adrenal. et Cocain.)—Adrenaline and Cocaine Suppository. Each suppository contains $\frac{1}{80}$ grain of adrenaline and $\frac{1}{4}$ grain of cocaine hydrochloride.

Trochiscus Krameriæ et Cocainæ, B.P.—(Troch. Kramer. et Cocain.)—Lozenge of Krameria and Cocaine. *Syn.*—Krameria and Cocaine Lozenge. Each lozenge contains approximately 0·06 gramme or 1 grain of dry extract of krameria and approximately 0·003 gramme or $\frac{1}{20}$ grain of cocaine hydrochloride.

Unguentum Adrenalinæ et Cocainæ, B.P.C.—(Ung. Adrenal. et Cocain.)—Cocaine and Adrenaline Ointment. Adrenaline, 0·1 per cent., as borate, and cocaine hydrochloride, 1 per cent., in hydrous wool fat and white soft paraffin.

COCCULUS INDICUS
(Cocc. Ind.)
Cocculus Indicus

Synonym—Cocculus; Levant Berries.

Cocculus indicus is the fruit of *Anamirta paniculata* Colebr. (Fam. Menispermaceæ), a climbing shrub indigenous to Eastern India and the Malay Archipelago. The fruit is collected when ripe, and dried.

The fruit is brownish-black in colour, finely wrinkled, about 11 to 12 millimetres in length, 9 to 10 millimetres in width, and 6 millimetres thick, being sub-reniform in shape. The pericarp is hard and tough, and about 1 millimetre thick; it bears, on the concave side, the circular scar of the stalk, and also a minute prominence, the remains of the style; joining these two there is a slight ridge about 5 millimetres long. The pericarp encloses a single oily, cup-shaped seed, into the hollow of which an ingrowth of the mesocarp and endocarp projects. The seed shows a crescent-shaped section when the fruit is cut either transversely or longitudinally. The fruit is odourless; the seed has a bitter taste, but the pericarp is tasteless.

Cocculus indicus **contains** the bitter, poisonous substance, picrotoxin, which occurs in the seeds to the extent of 1·0 to 1·5 per cent., associated with a little cocculin (animirtin). The seeds also contain about 50 per cent. of fat. In the pericarp of the fruit two tasteless alkaloids, menispermine and paramenispermine, have been found.

Action and Uses.—Cocculus indicus has an action similar to that of picrotoxin, which is generally preferred to the crude drug. Cocculus indicus has been used in the form of ointment (1 in 60) for destroying pediculi; a tincture (1 in 10) and a liquid extract (1 in 1) have also been prepared, generally for external use. The drug has been used as a fish-poison. In cases of **poisoning,** the antidotes described under Picrotoxinum should be employed.

COCCUS
(Cocc.)
Cochineal

Synonym—Coccus Cacti.

Cochineal is the dried female insect, *Dactylopius coccus* Costa (Order Hemiptera), containing eggs and larvæ. The insects are indigenous to Central America and Mexico, but the drug is now chiefly obtained from the Canary Islands where the insects are reared upon the branches of various species of *Nopalea* (Fam. Cactaceæ). After fecundation, the insects increase in size and develop an abundance of red colouring matter. They are then brushed off the plant, killed by the fumes of burning sulphur or charcoal, or by heat, and dried in the sun.

The dried insects are purplish-black or purplish-grey in colour, and about 3·5 to 5·5 millimetres long and 3 to 4·5 millimetres broad, oval in outline, flat or slightly concave on the ventral side, and convex on the dorsal. The dorsal surface is transversely wrinkled, showing about eleven segments. The ventral surface of a whole insect carries upon the anterior part, two 7-jointed straight antennæ, three pairs of short legs, each leg terminating in a single claw, and a mouth from which projects the remains of a filiform proboscis. Numerous short, tubular wax-glands are scattered over the dermis, either singly or in groups. Each insect contains numerous larvæ, usually about 150, the proboscides of which appear as two circular coils, one in each side of the head of each larva. The drug is readily reduced to a red or puce-coloured powder. The odour and taste are characteristic.

Cochineal **contains** about 10 per cent. of carminic acid, which occurs as small, red, prismatic crystals, soluble in water, alcohol and alkaline solutions. About 10 per cent. of fat and 2 per cent. of wax are also present, as well as albuminoids and inorganic matter. The fat consists almost entirely of free oleic, linoleic, and myristic acids. The tinctorial values of different specimens may be compared by titrating the solutions with chlorinated soda solution.

Varieties.—"Black grain" cochineal is uniform purplish-black and consists of insects of which the waxy secretion has been melted by the heat applied during preparation for the market. "Silver grain" cochineal is greyish-white and retains the waxy covering in its original condition.

Adulterants.—Cochineal is often artificially weighted with inorganic matter. In the case of the "silver grain" variety, barium or lead carbonate or sulphate is used, while the "black grain" variety may be "faced" with graphite, ivory black, or manganese dioxide, or may contain very dark grains of magnetic sand containing iron.

Standard, B.P.—Cochineal contains not more than 2 per cent. of foreign organic matter. Ash, not more than 7 per cent. No insoluble powder separates when the unground drug is placed in water.

Uses.—Cochineal, in the form of tincture or solution, is used principally as a colouring agent. For many purposes, owing to its greater stability and more constant colouring power in both acid and alkaline solutions, solution of bordeaux B is often preferred to preparations of cochineal (see Azorubrum). Tincture of cochineal is also used as an indicator.

Preparations

Liquor Cocci, B.P.C.—(Liq. Cocc.)—Solution of Cochineal. *Syn.*—Liquid Cochineal. Cochineal, 10 per cent. w/v, with potassium carbonate, potassium citrate, alcohol (90 per cent.) and distilled water.

Liquor Rosæ Dulcis, B.P.C.—(Liq. Ros. Dulc.)—Sweet Solution of Rose. Cochineal, 1 in 25, with oil of rose, potassium carbonate, potassium acid tartrate, potash alum, glycerin, alcohol (90 per cent.) and distilled water.

Tinctura Cocci, B.P.—(Tinct. Cocc.)—Tincture of Cochineal. Cochineal, 1 in 10, prepared by maceration with alcohol (45 per cent.). Dose.– 0·3 to 1 millilitre (5 to 15 minims).

CODEINA
(Codein.)
Codeine

$C_{18}H_{21}O_3N,H_2O = 317{\cdot}2$

Codeine is morphine monomethylether and may be obtained from opium or by the methylation of morphine. It occurs in colourless, odourless, translucent crystals, or as a crystalline powder, with a bitter taste. When 1 millilitre of a 10 per cent. solution of codeine in sulphuric acid is warmed with 1 drop of ferric chloride solution or of ammonium molybdate solution, a bluish-violet colour is produced which changes to red on the addition of one drop of dilute nitric acid. Codeine yields a yellow colouration with nitric acid. It is precipitated from dilute solutions of its salts by sodium or potassium hydroxide solution, but not by ammonia, and the oily precipitate first formed becomes crystalline on standing. It should be **stored** in well-closed containers and protected from light.

Soluble in water (1 in 120), boiling water (1 in 20), alcohol (90 per cent.) (1 in 2), ether (1 in 20), chloroform (1 in 2) and benzene (1 in 13); freely soluble in amyl alcohol, methyl alcohol and carbon disulphide; slightly soluble in light petroleum.

Standard, B.P.—Codeine, after drying at 100°, has a melting-point of 155° to 156°. Loss on drying at 100°, not more than 6 per cent. Ash, not more than 0·1 per cent. It complies also with limit tests for readily carbonisable substances and for morphine.

Action and Uses.—Codeine has only a mild hypnotic action; it does not depress the respiratory centre to the same extent as morphine, and does not arrest secretion, but it nevertheless diminishes local irritation in the respiratory organs. It is, therefore, much used to allay cough, especially the cough of phthisis, and is useful in insomnia where sleeplessness is caused by incessant coughing. Codeine is less constipating than morphine and is excreted by the kidneys. Like morphine, codeine decreases sugar in the urine in diabetes owing to its effect on metabolism, but it is not used in the treatment of diabetes. Codeine allays abdominal pain without giving rise to depression or preventing the action of the bowels. Habit formation from its continuous use is almost unknown. It is used in the withdrawal treatment of morphine addiction. Codeine may be **administered** in pills or tablets, often with antipyretics or with nux vomica and cascara sagrada. For solutions, the more soluble codeine phosphate is better than the free alkaloid. In cases of **poisoning** by codeine, the procedure adopted for Morphina should be followed.

Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

APOCODEINÆ HYDROCHLORIDUM.—Apocodeine hydrochloride is the salt of the base or mixture of bases obtained by the action of zinc chloride and hydrochloric acid on codeine. It occurs as a yellowish or greenish-grey, hygroscopic,

amorphous powder, freely soluble in water and less soluble in alcohol. Apocodeine hydrochloride has an action somewhat similar to that of apomorphine; it is a more pronounced expectorant but a milder emetic. It is sometimes used in the treatment of bronchitis, 2 millilitres (30 minims) of a 1 per cent. solution producing free expectoration. The same dose given hypodermically acts as a purgative, causing purgation in fifteen to thirty minutes which may be accompanied by vomiting. Dose.– 0·006 to 0·06 gramme ($\frac{1}{10}$ to 1 grain).

Preparations

Gelatinum Codeinæ, B.P.C.—(Gelat. Codein.)—Codeine Jelly. 1 in 500. Dose.– 4 grammes (1 drachm.)

Tabellæ Acetanilidi Compositæ cum Codeina, B.P.C.—(Tab. Acetanilid. Co. c. Codein.)—Compound Tablets of Acetanilide with Codeine. Each tablet contains 2 grains of acetanilide, $\frac{1}{2}$ grain of caffeine, 1 grain of sodium bicarbonate and $\frac{1}{6}$ grain of codeine. Dose.– 1 or 2 tablets.

CODEINÆ PHOSPHAS
(Codein. Phosph.)

Codeine Phosphate

$C_{18}H_{21}O_3N,H_3PO_4,H_2O = 415·2$

Codeine phosphate occurs in colourless, odourless, acicular crystals or as a crystalline powder, having a bitter taste and an acid reaction. It gives the reactions described under codeine. The anhydrous base is obtained by adding sodium hydroxide to an aqueous solution, allowing the precipitated oil to stand until crystalline, and then washing the precipitate and drying at 100°. Codeine phosphate should be **stored** in well-closed containers and protected from light.

Soluble in water (1 in 3·5), and alcohol (90 per cent.) (1 in 350); slightly soluble in ether and chloroform.

Standard, B.P.—Codeine phosphate loses, on drying at 100°, not less than 4 per cent. and not more than 7 per cent. of its weight. It complies also with limit tests for morphine, chloride and sulphate.

Action and Uses.—Codeine phosphate, on account of its greater solubility in water, is preferred to codeine for the preparation of syrups, linctuses and injections. Solutions for **injection** may be sterilised by tyndallisation, by filtration, or by heating at 100° for one hour, and should be stored protected from light.

Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

CODEINÆ HYDROCHLORIDUM.—Codeine hydrochloride, $C_{18}H_{21}O_3N,HCl,2H_2O$, occurs as a white, crystalline powder with a bitter taste. It is soluble in water (1 in 30). Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

CODEINÆ SULPHAS.—Codeine sulphate, $(C_{18}H_{21}O_3N)_2,H_2SO_4,5H_2O$, occurs as white crystals or as a white, crystalline powder, efflorescing in air and having a bitter taste. It is soluble in water (1 in 40), slightly soluble in alcohol, and insoluble in chloroform and ether. Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

Preparations

Linctus Codeinæ, B.P.C.—(Linct. Codein.)—Linctus of Codeine. Each fluid drachm contains codeine phosphate, ⅛ grain, with citric acid, emulsion of chloroform, glycerin and mucilage of tragacanth. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Syrupus Codeinæ Phosphatis, B.P.C.—(Syr. Codein. Phosph.)—Syrup of Codeine Phosphate. Codeine phosphate, 1 in 200, with distilled water and syrup; each fluid drachm contains about ¼ grain of codeine phosphate. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

This syrup was included in the British Pharmacopœia, 1914.

Sirupus codeini I.A. contains 0·2 per cent. of codeine in the form of the base or of a salt.

COLCHICI CORMUS
(Colch. Corm.)

Colchicum Corm

Colchicum corm is the corm of the meadow saffron, *Colchicum autumnale* Linn. (Fam. Liliaceæ), a plant widely distributed over Central and Southern Europe and common in parts of England. It is collected in early summer after the leaves have died down, and is used either fresh or after preparation by removing the coats, slicing transversely and drying at a temperature not higher than 65°.

The fresh corm is about 35 millimetres long and 25 millimetres broad; it is somewhat conical in shape, rounded on one side and flattened on the other, with a small depression near the base containing a bud. The corm is enclosed in a thin, brown, membranous outer coat and a reddish-yellow inner coat. Internally, it is white and solid and, when cut, it yields a whitish, turbid juice having a disagreeable odour and bitter taste. The dried corm occurs in slices about 2 to 5 millimetres thick and sub-reniform to ovate in outline, with yellowish-brown edges. The slices are hard and break readily with a short, mealy fracture; the cut surfaces are white and starchy and show vascular strands as small greyish points. The transverse surface treated with hydrochloric acid or sulphuric acid (20 per cent. v/v) assumes a yellow colour. The drug is odourless and has a bitter, acrid taste.

The diagnostic **microscopical** characters are the brown epidermal cells with indistinctly pitted, slightly wavy walls; the abundant large-celled parenchyma containing numerous starch grains, usually compound, with 2 to 4 or up to 7 components, but sometimes single, individual grains being spherical or ovoid to polyhedral or muller-shaped, 3 to 30 microns in diameter, with a triangular or stellate, central hilum; the occasional vessels, with spiral or annular thickening; the absence of sclerenchyma and calcium oxalate crystals.

Colchicum corm **contains** the alkaloid, colchicine (usually about 0·4 per cent. calculated on the dried corm); it also contains starch, gum, sugar, tannin, colouring matter and fat. The dried corm yields about 4 per cent. of ash.

Standard, B.P.—Colchicum corm contains not more than 2 per cent. of foreign organic matter, and the dried corm contains not less than 0·25 per cent. of colchicine.

Colchicum corm, in powder (Pulvis Colchici Cormi : Pulv. Colch. Corm.), contains the constituents and possesses the diagnostic microscopical characters of Colchici Cormus, and complies with the limit for colchicine of the dried unground drug.

Action and Uses.—Colchicum relieves the pain and inflammation of acute gout, but does not increase the quantity of the urine or the amount of uric acid excreted. It may cause considerable gastro-intestinal irritation with vomiting and purging. Its use for long periods is not recommended, owing to its depressant action upon the central nervous system. The dried corm in powder may be **administered** in pills, or the drug may be prescribed as Vinum Colchici or Extractum Colchici Siccum. The use of hyoscyamus or belladonna with colchicum removes the tendency to intestinal irritation, since colchicum, like jaborandi, excites the vagal nerve endings in the gut and these same nerves are paralysed by atropine. Generally, preparations of colchicum corm are best given with a purge. In cases of **poisoning** by colchicum, the stomach should be emptied; atropine should then be given to eliminate the effect of colchicum on the alimentary canal. If there is much cerebral depression, injections of caffeine and sodium salicylate should also be given.

Dose.– Of the dried corm, 0·12 to 0·3 gramme (2 to 5 grains).

Preparations

Extractum Colchici Aceticum, B.P.C.—(Ext. Colch. Acet.)—Acetic Extract of Colchicum. An unstandardised soft extract prepared by evaporating the juice expressed from the fresh corm to which acetic acid has been added. Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

Extractum Colchici Siccum, B.P.—(Ext. Colch. Sicc.)—Dry Extract of Colchicum. *Syn.*—Extractum Colchici; Extract of Colchicum. It is prepared with alcohol (60 per cent.), concentration being effected under reduced pressure at a temperature not exceeding 60°. The product is dried at 100° and adjusted with lactose to contain 1 per cent. of colchicine (limits, 0·9 to 1·1); 0·06 gramme contains 0·0006 gramme, and 1 grain contains about $\frac{1}{100}$ grain. It should be stored in small, wide-mouthed, well-closed containers in a cool place. Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

Extractum Colchici I.A. is prepared from colchicum seed and contains 2 per cent. of colchicine.

Pilulæ Colchici et Aloes, B.P.C.—(Pil. Colch. et Aloes)—Colchicum and Aloes Pills. Each pill contains ¼ grain each of dry extract of colchicum, dry extract of hyoscyamus and aloes. Dose.– 1 to 4 pills.

Pilulæ Colchici et Hydrargyri, B.P.C.—(Pil. Colch. et Hydrarg.)—Colchicum and Mercury Pills. Each pill contains ⅛ grain of dry extract of colchicum, ⅓ grain of pill of mercury and ½ grain of compound extract of colocynth. Dose.– 1 to 3 pills.

Pilulæ Colchici et Hydrargyri Compositæ, B.P.C.—(Pil. Colch. et Hydrarg. Co.)—Compound Colchicum and Mercury Pills. *Syn.*—Brodie's Gout Pills. Each pill contains ½ grain of dry extract of colchicum and 1⅓ grains each of pill of mercury, compound extract of colocynth and extract of rhubarb. Dose.– 1 or 2 pills.

Vinum Colchici, B.P.C.—(Vin. Colch.)—Colchicum Wine. Colchicum corm, 1 in 5, macerated in sherry-type wine. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

This wine, prepared with sherry, was included in the British Pharmacopœia, 1914.

COLCHICI SEMEN
(Colch. Sem.)
Colchicum Seed

Colchicum seed consists of the dried ripe seeds of the meadow saffron, *Colchicum autumnale* Linn. (Fam. Liliaceæ), a plant widely distributed over Central and Southern Europe, and common in parts of England.

The seeds are sub-spherical, about 2 to 3 millimetres in diameter, and have a slight projection at the hilum, from which a strophiole extends for about one quarter of the circumference. The testa is reddish-brown, or somewhat paler, and is dull and rough from the presence of minute pits; the abundant endosperm is hard, slightly oily and yellowish; the embryo is small, straight, and placed radially near the outer surface. The seed is odourless, and has an unpleasant, bitter taste.

The diagnostic **microscopical** characters are the parenchyma of the testa, composed of cells with reddish-brown walls; the cells of the endosperm with thick, pitted, cellulose walls, and containing fixed oil and aleurone grains; the thin-walled parenchyma of the strophiole, containing ovoid to polyhedral starch grains about 5 to 20 microns in diameter.

Colchicum seed **contains** about 0·3 to 0·6 per cent. of the alkaloid, colchicine, which resides chiefly in the seed coats; it also contains sugar and fixed oil. The ash of colchicum seed is usually from 3 to 5 per cent.

Standard, B.P.—Colchicum seed contains not more than 2 per cent. of foreign organic matter and not less than 0·3 per cent. of colchicine. Ash, not more than 3 per cent.

Colchicum seed, in powder (Pulvis Colchici Seminis : Pulv. Colch. Sem.), contains the constituents and possesses the diagnostic microscopical characters of Colchici Semen, and complies with the limits for colchicine and ash of the unground drug. Pulvis Colchici I.A. is adjusted, if necessary, by dilution with rice starch to contain 0·4 per cent. of colchicine.

Action and Uses.—The physiological action and therapeutic properties of colchicum seed are similar to those of the corm (see Colchici Cormus). The seed is **administered** chiefly in the form of liquid extract or tincture. In cases of **poisoning** by colchicum seed, the procedure described under Colchici Cormus should be followed.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

COLCHICI FLOS.—Colchicum flower is the fresh perianth of the meadow saffron, *Colchicum autumnale* Linn, which blooms in the late summer; the flowers appear to spring directly from the ground, the plant having no leaves at this season. The six, petaloid, perianth parts are united to form a tube 7 to 8 centimetres long, whitish below, and expanding above into a funnel-shaped limb with six segments in two whorls. The oval-lanceolate segments are reddish-lilac or pale purple and about 3·5 to 5 centimetres long. To the inner surface of the perianth tube six stamens are attached. Colchicum flower contains about 0·1 per cent. of colchicine. It resembles the corm and the seed in its action, and has been used in the form of a tincture.

Preparations

Extractum Colchici Liquidum, B.P.—(Ext. Colch. Liq.)—Liquid Extract of Colchicum. *Syn.*—Fluidextractum Colchici. It is prepared with alcohol (60 per cent.) from defatted seeds, and adjusted to contain 0·3 per cent. w/v of colchicine (limits, 0·27 to 0·33); 0·3 millilitre contains about 0 0009 gramme and 5 minims contains about $\frac{1}{70}$ grain of colchicine. Dose.—0·12 to 0·3 millilitre (2 to 5 minims).

Tinctura Colchici, B.P.—(Tinct. Colch.)—Tincture of Colchicum. Liquid extract of colchicum, 10 per cent. v/v, in alcohol (60 per cent.). It contains 0·03 per cent. w/v of colchicine (limits, 0·027 to 0·033); 1 millilitre contains 0·0003 gramme and 15 minims contains about $\frac{1}{750}$ grain of colchicine. Dose.—0·3 to 1 millilitre (5 to 15 minims).

Tinctura Colchici I.A. is prepared with alcohol (70 per cent.) and contains 0·04 per cent. of colchicine.

Vinum Colchici Seminis, B.P.C.—(Vin. Colch. Sem.)—Colchicum Seed Wine. Colchicum seed, 1 in 10, macerated in detannated sherry-type wine. Dose.—0·6 to 2 millilitres (10 to 30 minims).

COLCHICINA

(Colchicin.)

Colchicine

$C_{22}H_{25}O_6N = 399·2$

Colchicine is an alkaloid obtained from the corm and seeds of *Colchicum autumnale* Linn. It occurs in the form of yellow flakes, crystals, or as a whitish-yellow amorphous powder, having a hay-like odour when damped and warmed, a very bitter taste, and darkening on exposure to light. An aqueous solution of colchicine is neutral to litmus, and lævorotatory. Melting-point, when dry, about 145°; when recrystallised from ethyl acetate, about 156°. It is a feeble base and is decomposed when warmed with dilute acids or alkalis, methyl alcohol and colchiceine being formed. It is extracted from acid solution by chloroform. From a solution in chloroform a compound of colchicine and chloroform is obtained by evaporation; in colchicine assays, the chloroform is removed by evaporation of the residue with alcohol. When a small quantity is dissolved in sulphuric acid and a little nitric acid added, a greenish-blue colour is produced, which changes through sky-blue to red and yellow; on the addition of sodium hydroxide the yellow solution becomes red. 0·05 gramme dissolved in 1 millilitre of dehydrated alcohol produces immediately a garnet-red

colour on the addition of one drop of ferric chloride solution. Colchicine should be **stored** in a dark place.

Soluble in water, alcohol and chloroform; very slightly soluble in ether; almost insoluble in light petroleum.

Standard.—Colchicine yields not more than 0·1 per cent. of ash. 0·01 gramme heated with 2 millilitres of sodium hydroxide solution and one drop of aniline does not develop the odour of phenyl isocyanide (limit of chloroform compound). 0·05 gramme dissolved in 5 millilitres of water produces no colour on the addition of ferric chloride solution (limit of colchiceine), but, on heating, a brownish-red colour is produced.

Action and Uses.—Colchicine in large doses has a marked action on plain muscle, especially of the intestine, producing increased peristalsis and setting up diarrhœa and vomiting. Large doses produce, after a latent period of from one to three hours, a motor and sensory paralysis, ending in death from respiratory failure. Colchicine undergoes change to oxydicolchicine in the system. It first decreases and then increases the proportion of leucocytes in the blood, and excites karyokinesis in bone-marrow cells.

Colchicine is employed in acute gout; its action may be due to its effect upon the white corpuscles or to a corresponding stimulation of tissues of the body. It has no effect on the heart and circulatory system. Colchicine is occasionally **administered** in the form of solution, but solutions do not keep well, and in pills. The alkaloid is used in combination with methyl salicylate in capsules containing 0·25 milligram ($\frac{1}{250}$ grain) of the base or of colchicine salicylate. Solutions for **injection** may be sterilised by tyndallisation at 70° for one hour on three successive days, or by filtration. The containers should comply with the tests for limit of alkalinity of glass, and the solution should be protected from light. In cases of **poisoning** by colchicine, the procedure described under Colchici Cormus should be followed.

Dose.– 0·0005 to 0·002 gramme ($\frac{1}{120}$ to $\frac{1}{30}$ grain).

COLCHICINÆ SALICYLAS.—Colchicine salicylate, $C_{22}H_{25}O_6N,C_7H_6O_3$, occurs as a yellow, amorphous powder, soluble in water, alcohol and ether. It has been recommended in acute sciatica where there is a history of gout, in doses and in form similar to those of the alkaloid.

COLLINSONIA

(Collinson.)

Collinsonia

Synonyms—Stone Root; Knob Root.

Collinsonia is the rhizome of *Collinsonia canadensis* Linn. (Fam. Labiatæ), a plant indigenous to the United States of America and Canada.

The rhizome occurs in irregular, very hard, greyish-brown pieces, from 5 to 10 centimetres in length and 1 to 2 centimetres in diameter. The upper surface bears the remains of short, conical buds and conspicuous, shallow scars of aerial stems; on the under surface are short wiry roots or depressed scars of the same. The fracture is short; the transversely cut surface shows a wide, brown cork, a narrow cortex containing starch, and a large, whitish pith surrounded by a ring of thin, dark wedges of wood. The pith and very wide medullary rays are lignified and contain starch. The starch grains are simple, except a few which consist of two components, the simple grains being cylindrical, reniform, ovoid or oblong, and varying from about 3 to 38 microns in length. The drug is odourless and tasteless.

Collinsonia **contains** a saponin, resin, tannin, starch, mucilage and wax. It yields to alcohol (60 per cent.) about 10 per cent. of extractive.

Standard.—Collinsonia yields not more than 5 per cent. of ash.

Collinsonia, in powder (Pulvis Collinsoniæ : Pulv. Collinson.), contains the constituents of Collinsonia, and complies with the standard for the unground drug.

Action and Uses.—Collinsonia acts as an antispasmodic, and is employed in gastric and intestinal flatulence and in biliary colic. It is usually administered in the form of tincture.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

Preparation

Tinctura Collinsoniæ, B.P.C.—(Tinct. Collinson.)—Tincture of Collinsonia. 1 in 10. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

COLOCYNTHIS

(Colocynth.)

Colocynth

Synonyms—Colocynthidis Pulpa; Colocynth Pulp; Bitter Apple.

Colocynth is the dried pulp of the fruit of *Citrullus Colocynthis* Schrad. (Fam. Cucurbitaceæ), a prostrate, herbaceous perennial, widely distributed throughout North Africa, Syria, Persia and North-West India, and cultivated in Spain and Cyprus. The fruit is collected when ripe, dried, and freed from the rind. The drug occurs in commerce in light, whitish balls about 5 centimetres in diameter, often more or less broken. The seeds, which constitute about 75 per cent. of the weight of the imported drug, are separated from the pulp by breaking the fruits and picking or sifting.

The dried pulp occurs in white or pale yellowish-white, light, pithy fragments. Very few seeds escape removal; they are about 7 millimetres long and 4·5 millimetres wide, and flattened-ovoid in shape;

the testa is yellowish-white to dark brown, smooth externally, and extremely hard; the seed is exalbuminous, and the embryo contains a large amount of fixed oil. The pulp is odourless and has an intensely bitter taste.

The diagnostic **microscopical** characters are the large, thin-walled, parenchymatous cells separated by intercellular spaces and showing flat, rounded, pitted areas where they are in contact; the occasional spiral and annular vessels; the absence of starch grains, crystals of calcium oxalate and of sclerenchymatous cells, excepting such small proportion as corresponds to an amount of seed not exceeding 5 per cent., and to an amount of outer sclerenchymatous part of the pericarp not exceeding 2 per cent.

Colocynth **contains** a bitter, amorphous, purgative alkaloid and amorphous, purgative resins; it also contains a small amount of an amorphous glycoside, and the following substances which are physiologically inactive:—α-elaterin, citrullol, hentriacontane, a phytosterol, and a mixture of fatty acids. The seeds contain about 15 per cent. of fixed oil, traces of an alkaloid, a phytosterol and an enzyme which hydrolyses β-glycosides.

Varieties.—Turkey colocynth, imported from Cyprus and Syria, consists of carefully peeled and unbroken fruits; it is white in colour and when cut transversely shows three large splits radiating from the centre, and six peripheral groups of seeds. Spanish colocynth resembles the Turkish variety but is usually more or less discoloured and less carefully peeled. Egyptian colocynth, from the Anglo-Egyptian Sudan, is generally in broken pieces, but of good colour. The seeds must be removed before use.

Standard, B.P.—Colocynth contains not more than 5 per cent. of the seeds and not more than 2 per cent. of the outer sclerenchymatous part of the pericarp. Acid-insoluble ash, not more than 8 per cent. By continuous extraction with light petroleum (boiling-point, 50° to 60°), it yields not more than 3 per cent. of soluble matter dried at 100°.

Colocynth, in powder (Pulvis Colocynthidis : Pulv. Colocynth.), contains the constituents and possesses the diagnostic microscopical characters of Colocynthis, and complies with the limits for acid-insoluble ash and matter soluble in light petroleum of the unground drug.

Action and Uses.—Colocynth is a powerful hydragogue cathartic; it is rarely used alone on account of its drastic nature, but is an important ingredient of Extractum Colocynthidis Compositum, Pilulæ Colocynthidis Compositæ and Pilula Colocynthidis et Hyoscyami. Colocynth principles are partly absorbed, and excreted in the urine and milk. Colocynth is extremely irritant, severe pain being caused when the powdered drug is applied to the nostrils. A simple tincture of colocynth (Tinctura Colocynthidis, 1 in 10) has been used in mixture form with the tinctures of podophyllum and belladonna. In cases of **poisoning** by colocynth, the stomach should be emptied, opium given by mouth or rectum, followed by stimulants and demulcent drinks.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

Preparations

Extractum Colocynthidis Compositum, B.P.—(Ext. Colocynth. Co.)—Compound Extract of Colocynth. It contains aloes, scammony resin, curd soap and cardamom, mixed with an extract prepared by macerating colocynth in alcohol (60 per cent.) and evaporating to dryness the liquid thus obtained. Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

Pilulæ Colocynthidis Compositæ, B.P.C.—(Pil. Colocynth. Co.)—Compound Pills of Colocynth. *Syn.*—Pil. Cochia. Each pill contains $\frac{2}{3}$ grain of colocynth, $1\frac{1}{3}$ grains each of aloes and scammony resin, with curd soap and oil of clove. Dose.– 1 or 2 pills.

The mass with which these pills are made contains approximately the same relative proportions of active ingredients as Pilula Colocynthidis Composita of the British Pharmacopœia, 1914, which was prepared with colocynth, 20 grammes; aloes, 35 grammes; scammony resin, 35 grammes; potassium sulphate, 5 grammes; oil of clove, 5 millilitres; distilled water, a sufficient quantity.

Pilulæ Colocynthidis et Hydrargyri, B.P.C.—(Pil. Colocynth. et Hydrarg.)—Colocynth and Mercury Pills. Each pill contains 2 grains of compound extract of colocynth and 3 grains of pill of mercury. Dose.– 1 or 2 pills.

Pilulæ Colocynthidis et Hydrargyri Compositæ, B.P.C.—(Pil. Colocynth. et Hydrarg. Co.)—Compound Colocynth and Mercury Pills. Each pill contains $\frac{2}{3}$ grain of pill of colocynth and hyoscyamus and $\frac{1}{3}$ grain of pill of mercury. Dose.– 1 to 4 pills.

Pilula Colocynthidis et Hyoscyami, B.P.—(Pil. Colocynth. et Hyoscy.)—Pill of Colocynth and Hyoscyamus. Colocynth, about 12·5 per cent., aloes and scammony resin, of each about 25 per cent., with curd soap, oil of clove, dry extract of hyoscyamus and syrup of liquid glucose. Dose.– 0·25 to 0·5 gramme (4 to 8 grains).

Pilulæ Hydrargyri Subchloridi, Colocynthidis et Hyoscyami, B.P.C.—(Pil. Hydrarg. Subchlor. Colocynth. et Hyoscy.)—Mercurous Chloride, Colocynth and Hyoscyamus Pills. *Syn.*—Calomel, Colocynth and Hyoscyamus Pills; Zittmann's Pills. Each pill contains 1 grain of mercurous chloride, $2\frac{1}{2}$ grains of compound extract of colocynth and 1 grain of dry extract of hyoscyamus. Dose.– 1 or 2 pills.

Pilulæ Hydrargyri Subchloridi et Colocynthidis, B.P.C.—(Pil. Hydrarg. Subchlor. et Colocynth.)—Mercurous Chloride and Colocynth Pills. *Syn.*—Calomel and Colocynth Pills. Each pill contains 1 grain of mercurous chloride and 4 grains of compound extract of colocynth. Dose.– 1 pill.

Tabellæ Leptandræ Compositæ, B.P.C.—(Tab. Leptand. Co.)—Compound Tablets of Leptandra. *Syn.*—Tabellæ Laxativæ Compositæ; Vegetable Laxative Tablets. Each tablet contains 1 grain of compound extract of colocynth and $\frac{1}{3}$ grain each of jalap resin, resin of podophyllum, dry extract of hyoscyamus, extract of taraxacum and extract of leptandra, and oil of peppermint. Dose.– 1 to 3 tablets.

COLOPHONIUM

(Coloph.)

Colophony

Synonyms—Resina; Resin; Rosin; Amber Resin.

Colophony is the residue left after the removal, by distillation, of the

oil of turpentine from the crude oleo-resin obtained from *Pinus palustris* Mill., *P. tæda* Linn. and other species of *Pinus* (Fam. Pinaceæ), trees growing in Europe and the United States of America. Although the trees normally contain schizogenous resin ducts, these are sufficient to yield only a very small amount of oleo-resin, the bulk of which is produced by hacking the trees so as to wound the young wood; the new wood formed in the region of the injury is very liberally supplied with oleo-resin ducts, from which the secretion flows abundantly over the wounded area and is collected either in a cavity or "box" cut in the base of the tree trunk, or in receptacles attached to the tree below the wounded area. The crude oleo-resin is distilled with water, the oil of turpentine passing over and the resin remaining in the still.

Colophony occurs in transparent, pale yellow or brownish-yellow, angular, brittle masses, which are readily fusible and have a faint terebinthinate odour and taste. On the addition of one drop of sulphuric acid to 10 millilitres of a 1 per cent. solution of colophony in acetic anhydride, a bright purplish-red colour is produced which rapidly changes to violet. When a filtered 1 per cent. solution of colophony in light petroleum is shaken with twice its volume of dilute copper acetate solution, the light petroleum layer assumes a bright bluish-green colour. Colophony is **soluble** in alcohol (90 per cent.), ether, benzene and carbon disulphide; partially soluble in light petroleum; insoluble in water.

Colophony appears to **contain** three isomeric abietic acids (α, β, and γ), together with a small quantity (5 to 6 per cent.) of a resene, traces of volatile oil, and a bitter principle. Crystalline colophenic acids have also been isolated from it. The resin acids appear to undergo change (probably oxidation) when exposed to the air, and become less soluble in light petroleum. The exact composition is still a matter of uncertainty.

Substitutes.—Black resin is the resin obtained from the later runnings from the incisions into the trees or it may be formed by long continued application of heat to the amber-coloured colophony. If the water is not entirely removed during the process an opaque resin results.

Standard, B.P.—Colophony has an acid value ranging from 150 to 180. Ash, not more than 0·1 per cent.

Colophony, in powder (Pulvis Colophonii : Pulv. Coloph.), complies with the standard for the unground drug.

Action and Uses.—Colophony was formerly given internally for rheumatism, sometimes with guaiacum resin. It is partly absorbed, and excreted in the urine; during excretion it excites the kidneys to diuresis. Sometimes so much is excreted in the urine that nitric acid causes a precipitate of the resin, simulating albumin; the precipitate is readily distinguished from albumin in that it is soluble in alcohol. Emplastrum Colophonii is used as an adhesive plaster in minor surgery for strapping wounds. Unguentum Colophonii is applied as a stimulant to indolent ulcers and boils.

Preparations

Emplastrum Colophonii, B.P.—(Emp. Coloph.)—Plaster of Colophony. *Syn.*—Emplastrum Resinæ; Resin Plaster; Adhesive Plaster. Colophony, 10 per cent., and hard soap, 5 per cent., in plaster of lead.

Resina Carbolisata, B.P.C.—(Res. Carbol.)—Carbolised Resin. Phenol, 1 part; mastic, 1 part; colophony, 2 parts; chloroform, 1 part.

Unguentum Colophonii, B.P.C.—(Ung. Coloph.)—Colophony Ointment. *Syn.*—Unguentum Resinæ; Resin Ointment; Yellow Basilicon Ointment. Colophony, 26 per cent., with yellow beeswax, olive oil and lard.

This ointment was included in the British Pharmacopœia, 1914, under the name of Unguentum Resinæ.

CONDURANGO

(Conduran.)

Condurango

Condurango is the bark obtained from the stem of *Marsdenia Condurango* Nichols (Fam. Asclepiadaceæ), a climbing plant indigenous to Ecuador. The bark is removed by beating the stem with a mallet, and dried in the sun.

The bark occurs in quilled or curved pieces about 5 to 10 centimetres long, 0·5 to 2·0 centimetres wide and 2 to 6 millimetres thick. Externally is a thin, greyish-brown cork, often warty, and sometimes scaly. The inner surface is paler and coarsely striated. The fracture is short and somewhat fibrous. The smoothed, transverse surface is pale and shows a few scattered groups of sclereids. The taste is bitter and somewhat acrid, but the odour is slight.

The diagnostic **microscopical** characters are the phelloderm cells containing prismatic crystals of calcium oxalate; rosette crystals in the rest of the tissues; clusters of pitted stone cells scattered in the cortex and phloem; laticiferous vessels throughout the bark.

The bark **contains** the poisonous glycoside, or mixture of glycosides, known as condurangin, together with a crystalline resin-ester and traces of fat and volatile oil. Aqueous solutions of condurangin coagulate or become cloudy when heated and clear again on cooling. Decoctions of condurango should, therefore, be strained when cold. This property has been shown to be due to the presence of water-soluble salts, and when these are removed solutions of condurangin remain clear when boiled. Condurangin has been considered to be identical with vincetoxin. The ash of the bark is about 9 per cent.

Action and Uses.—Condurango has been **administered** as a gastric sedative in the form of a liquid extract (Extractum Condurango Liquidum, 1 in 1), and as a wine (Vinum Condurango, 1 of liquid extract to 9 of detannated sherry).

Dose.– 1 to 4 grammes (¼ to 1 drachm).

CONII FOLIUM
(Conii Fol.)
Conium Leaf

Synonym—Hemlock Leaf.

Conium leaf consists of the fresh, leafy tops of *Conium maculatum* Linn. (Fam. Umbelliferæ), an annual or biennial herbaceous plant distributed throughout Europe and Great Britain. The leaves and young branches are collected when the fruit is beginning to form.

The leaves are tripinnate and glabrous; the ultimate divisions are ovate or lanceolate, with serrate margins, and terminate in smooth, colourless points. The leaves are attached by amplexicaul petioles to smooth, hollow stems marked with purplish spots. The inflorescence is a compound umbel with ten to twenty rays; the general involucre has three to seven bracts; the partial involucre has three outwardly-directed, lanceolate bracts which are shorter than the partial umbels. The fruit is a cremocarp with crenate ridges and deeply grooved endosperm. The odour is nauseous and mouse-like, and is accentuated by the action of caustic alkali; the taste is bitter.

Conium leaf **contains** the alkaloids, coniine (conine), γ-coniceine and conhydrine; the stem contains about 0·05 per cent. of total alkaloids, the leaves about 0·2 per cent., and the flowers and flower-stalks about 0·25 per cent. Conium also contains methylconiine and pseudoconhydrine.

Adulterants.—Conium leaf is liable to adulteration with the leaves and young branches of other indigenous umbelliferous plants, such as wild chervil, *Anthriscus sylvestris* Hoffm., and fool's parsley, *Æthusa Cynapium* Linn. Wild chervil is distinguished by its hairy leaves; fool's parsley by the absence of a general involucre of bracts, the three long narrow bracts of the involucels, and the ultimate divisions of the leaves which terminate in short, brownish points.

Action and Uses.—Conium leaf has been used internally as a sedative and antispasmodic in the form of Succus Conii, or as Extractum Conii in pills or suppositories. Externally, Unguentum Conii is a soothing application to hæmorrhoids and other irritable conditions of the rectum. In cases of **poisoning** by conium leaf, the antidotes described under Coniina should be employed.

Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

Preparations

Extractum Conii, B.P.C.—(Ext. Conii)—Extract of Conium. *Syn.*—Extract of Hemlock. A soft extract prepared from the juice expressed from conium leaf. Dose.– 0·12 to 0·4 gramme (2 to 6 grains).

Succus Conii, B.P.C.—(Succ. Conii)—Juice of Conium. *Syn.*—Juice of Hemlock. The juice expressed from conium leaf, mixed with one-third its volume of alcohol (90 per cent.). Dose– 2 to 4 millilitres (½ to 1 fluid drachm).

Unguentum Conii, B.P.C.—(Ung. Conii)—Ointment of Conium. *Syn.*—Hemlock Ointment. Extract of conium, 7 per cent., in glycerin and simple ointment.

CONII FRUCTUS
(Conii Fruct.)
Conium Fruit

Synonym—Hemlock Fruit.

Conium fruit consists of the dried, unripe fruits of *Conium maculatum* Linn. (Fam. Umbelliferæ), a plant distributed throughout Europe and Great Britain. The fruits are collected and dried when fully grown, but before they are ripe. They deteriorate with age and should not be used when more than two years old.

The fruits are greenish-grey in colour, and about 3 millimetres in length and breadth. In shape, the cremocarps are broadly ovoid, slightly compressed laterally and crowned with small stylopods. The separate mericarps are quite glabrous and marked with five irregularly crenate, primary ridges. The fruits have no marked odour or taste, but develop a strong, disagreeable, mouse-like odour when triturated with potassium hydroxide solution; this odour is, however, not strong enough for the detection of small admixtures of conium with other fruits. A transverse section through the fruit shows the endosperm to be deeply grooved on the commissural surface; vittæ cannot be seen with a lens, although vestiges may be found by careful microscopical examination.

Conium fruit **contains** as much as 2·5 per cent. of alkaloids, consisting mainly of coniine, if gathered when fully grown but still unripe. Parcels containing considerable proportions of ripe fruits may yield less than 1 per cent., and carelessness in collection, or too lengthy storage, may reduce the percentage to less than 0·1. The subsidiary alkaloids are conhydrine, γ-coniceine, methylconiine and pseudoconhydrine.

Standard.—Conium fruit contains not more than 2 per cent. of foreign organic matter. Ash, not more than 7 per cent.

Action and Uses.—Conium fruit is used principally as a source of coniine, although preparations of it may be used internally as sedatives or antispasmodics. In cases of **poisoning** by conium fruit, the antidotes described under Coniina should be employed.

CONIINA
(Coniin.)
Coniine

$C_8H_{17}N = 127·1$

Synonyms—Conine; Cicutine.

Coniine, or *d*-α-propylpiperidine, $C_5H_{10}N(C_3H_7)$, is a liquid alkaloid found in all parts of *Conium maculatum* Linn., but more especially in the immature fruit, in combination with malic acid. It may

be obtained by distilling the crushed seeds with weak solution of potassium hydroxide, neutralising the distillate, evaporating the solution to dryness, adding excess of alkali to the alkaloidal salt, extracting the base thus liberated with ether, and, finally, purifying by distillation. The product is a mixture of hemlock alkaloids in which *d*-coniine predominates. Racemic coniine may be prepared synthetically by the action of sodium on an alcoholic solution of allylpyridine, which is a liquid product of the action of paraldehyde on picoline.

Coniine occurs in the form of an almost colourless liquid with a penetrating, mouse-like odour and an acrid taste; it is volatile and dextrorotatory, and becomes brown on exposure to the air. The aqueous solution has an alkaline reaction. The base takes up 25 per cent. of water, and the cold, saturated solution becomes turbid on warming. Specific gravity, about 0·863 at 0° and about 0·844 at 19°. Boiling-point, about 166°. On cooling, it solidifies to a crystalline mass, which melts at −2°. It is a powerful base, and unites with acids to form stable crystalline salts. With concentrated sulphuric acid it gives first a blood-red and then a green colour. Cadmium iodide yields an amorphous precipitate, distinguishing it from nicotine, which yields a crystalline precipitate. Coniine, unlike nicotine, is not precipitated by platinic chloride. A further distinguishing test is to add 1 drop of a concentrated alcoholic solution of phenolphthalein to a solution of the base; with coniine a red colour is developed, but with nicotine there is no reaction.

Soluble in water (1 in 100), alcohol, ether, chloroform, benzene, amyl alcohol and acetone.

Action and Uses.—Coniine depresses the medulla and the motor nerve-endings, so that after large doses death results from respiratory paralysis, which is mainly central—that is, the medulla is paralysed before the nerves. On the circulatory system, coniine resembles nicotine in action in that it paralyses autonomic nerve-cells after an initial stimulation, and so lowers blood pressure by paralysis of the splanchnics, and quickens the heart by paralysis of the vagi. It has been used in chorea, mania, paralysis agitans, tetanus, and strychnine poisoning for its depressant action on the motor nerves, but in this respect is inferior to curare. It is also employed in spasmodic affections such as laryngismus, whooping cough and asthma. To allay cough and bronchial spasm it is best given as an inhalation. **Externally,** it is sedative and specially valuable in pruritus ani, and for the relief of the pain of fissures and ulcerated hæmorrhoids.

The alkaloid is rarely administered, coniine hydrobromide or hydrochloride being preferred. In cases of **poisoning** by coniine or its salts, the stomach should be emptied, and stimulants and warmth applied, with artificial respiration if necessary. As an antidote, strong tea or 1 to 1·2 grammes (15 to 20 grains) of tannic acid in aqueous solution should be given.

Dose.– 0·001 to 0·01 gramme ($\frac{1}{64}$ to $\frac{1}{6}$ grain).

CONIINÆ HYDROBROMIDUM.—Coniine hydrobromide, $C_8H_{17}N,HBr$, a salt of the base with hydrobromic acid, occurs in the form of colourless, transparent, glistening, rhombic crystals, or as a white, crystalline powder, melting at about 212°. It is soluble in water (1 in 2), alcohol (1 in 3), or in ether-alcohol, but insoluble in ether. The solutions are colourless and neutral. Coniine hydrobromide may be administered in pills or in syrup. Pessaries may be prepared with a glyco-gelatin basis and contain ½ grain of coniine hydrobromide. Dose.– 0·004 to 0·016 gramme ($\frac{1}{16}$ to $\frac{1}{4}$ grain).

CONIINÆ HYDROCHLORIDUM.—Coniine hydrochloride, $C_8H_{17}N,HCl$, a salt of the base with hydrochloric acid, occurs in the form of colourless crystals, soluble in water, alcohol, or chloroform. Melting-point, about 220°. Coniine hydrochloride is used in the same manner as the hydrobromide.

CONVALLARIA

(Convallar.)

Convallaria

Synonyms—Convallaria Flowers; Lily of the Valley Flowers.

Convallaria consists of the dried inflorescence of *Convallaria majalis* Linn. (Fam. Liliaceæ), a small herbaceous plant indigenous to Britain and widely distributed over Europe, North America and Northern Asia.

The scape is about 20 centimetres long, about 2 millimetres wide at the base, and tapers towards the apex; it is semi-circular in transverse section, the flattened side appearing in the drug as a longitudinal, shallow groove. Upon the upper part of the scape are from about 3 to 8 pale brown, shrivelled flowers, each attached to a slender pedicel about 8 millimetres long and arising in the axil of a small, scarious, lanceolate bract. The perianth is from about 4 to 5 millimetres in length and breadth; it has 6 recurved teeth, and bears 6 stamens on its inner surface; the ovary is superior and tri-locular. The odour is slight and pleasant; the taste is at first sweetish and then bitter and slightly acrid. The drug yields to alcohol (60 per cent.) about 30 per cent. of extractive. The ash is about 10 per cent.

Convallaria **contains** two crystalline glycosides, convallamarin, $C_{23}H_{44}O_{12}$, and convallarin, $C_{34}H_{62}O_{11}$. Convallamarin has a bitter taste.

Action and Uses.—Convallaria has an action similar to that of digitalis, and is used chiefly in the form of tincture.

CONVALLARIÆ RHIZOMA.—Dried convallaria rhizome is of varying length and about 3 millimetres thick. It is whitish or pale brown, cylindrical, wrinkled, and marked with circular scars. The nodes are annulated and bear long, thin, tortuous branched roots or scars where they have been detached. The fracture is fibrous and the interior white in colour. Odour, slight; taste, at first sweet, becoming bitter and slightly acrid.

Preparations

Extractum Convallariæ Liquidum, B.P.C.—(Ext. Convallar. Liq.)—Liquid Extract of Convallaria. 1 in 1. Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

Tinctura Convallariæ, B.P.C.—(Tinct. Convallar.)—Tincture of Convallaria. 1 in 8. Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

COPAIBA
(Copaib.)
Copaiba

Synonym—Balsam of Copaiba.

Copaiba is the oleo-resin obtained from the trunk of *Copaifera Lansdorfii* Desf. and other species of *Copaifera* Linn. (Fam. Leguminosæ), large trees indigenous to Brazil and the north of South America. The oleo-resin is secreted in schizogenous ducts which subsequently form large lysigenous cavities in the trees; it is collected by boring into the base of the trunk and allowing to drain out. It occurs as a more or less viscous, yellow to golden-brown liquid, which is generally transparent and sometimes fluorescent. The various commercial varieties are named after the towns from which they are exported, and differ somewhat in appearance and composition. The most important are known as Pará, Maranham, Maracaibo and Savanilla. Pará copaiba is a thin, transparent, yellowish liquid, and contains a high percentage of volatile oil. Maracaibo copaiba is viscous, brownish-yellow and slightly fluorescent. Copaiba has a characteristic odour and a persistent, slightly bitter, acrid taste.

Copaiba **contains** varying proportions of volatile oil and resin. The resin obtained by heating the balsam in a shallow dish until the oil has been completely dissipated, is a hard, brittle mass which consists chiefly of amorphous resin-acids accompanied by a small quantity of crystalline resin-acids and indifferent resenes, the nature of these constituents varying in different varieties.

Miscible in all proportions with dehydrated alcohol, ether, carbon disulphide, fixed and volatile oils; miscible with an equal volume of light petroleum (boiling-point, 50° to 60°), the addition of a further quantity of the solvent producing a flocculent precipitate.

Standard, B.P.—Copaiba has a specific gravity of 0·960 to 0·995. Acid value, calculated with reference to the residue obtained by drying on a water-bath, 120 to 160. Optical rotation of the volatile oil obtained by distillation with steam, or under reduced pressure, —7° to —35°. Residue on evaporation on a water-bath, not less than 50 per cent. and not more than 65 per cent. No odour of turpentine is observed during the evaporation, and the residue is hard and brittle when cold. It complies also with tests for absence of gurjun balsam and fatty oils.

Action and Uses.—Copaiba is carminative and antiseptic, and is used for its effects during excretion by the bronchioles, skin and kidneys. It is eliminated in the urine, which then gives the test for albumin with nitric acid by the precipitation of the resin-acids. It is especially used in chronic inflammation of the genito-urinary tract for its mildly stimulant action upon the inflamed mucous membrane and for its antiseptic properties. In chronic bronchitis, especially where there is much expectoration, it is of value. It may produce a rash, and its continued use tends to cause irritation of the gastric mucous membrane.

On account of its disagreeable taste copaiba is commonly administered in gelatin capsules. Emulsions of copaiba may be prepared with solution of potassium hydroxide which dissolves the resin, or with mucilage of acacia. Miscible solutions are prepared from copaiba, alone or combined with sandal wood oil cubeb, and buchu.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

AFRICAN COPAIBA is obtained from an unknown botanical source and is imported from West Africa. It occurs as a dark yellow, slightly fluorescent oleo-resin, with an aromatic odour. Specific gravity, 0·985 to 1·000. It contains about 40 per cent. of a dextrorotatory volatile oil.

GURJUN BALSAM, or wood oil, is an oleo-resin obtained from *Dipterocarpus turbinatus* Gaertn. (Fam. Dipterocarpaceæ) and other species, large trees indigenous to Eastern India and Burma. It resembles copaiba in odour and taste, but is usually somewhat darker. It contains from 40 to 80 per cent. of volatile oil.

Preparations

Liquor Copaibæ, B.P.C.—(Liq. Copaib.)—Solution of Copaiba. *Syn.*—Soluble Copaiba. Copaiba, 1 in 2, dissolved in a solution of potassium hydroxide. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Liquor Copaibæ, Buchu et Cubebæ, B.P.C.—(Liq. Copaib. Buchu et Cubeb.)—Solution of Copaiba, Buchu and Cubeb. Solution of copaiba, 4 in 5, with liquid extracts of buchu and cubeb. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Liquor Copaibæ, Buchu et Cubebæ cum Oleo Santali, B.P.C.—(Liq. Copaib. Buchu et Cubeb. c. Ol. Santal.)—Solution of Copaiba, Buchu and Cubeb with Sandal Wood Oil. Oil of sandal wood, 1 in 10, and oil of cassia, 1 in 20, with solution of copaiba, buchu and cubeb, and alcohol (90 per cent.). Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Liquor Copaibæ et Olei Santali, B.P.C.—(Liq. Copaib. et Ol. Santal.)—Solution of Copaiba and Sandal Wood Oil. Solution of copaiba, 4 in 5, with oils of sandal wood and cassia, and alcohol (90 per cent.). Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

COPAL

(Copal)

Copal

Synonyms—Zanzibar Copal; Gum Animi.

Copal is a fossil resin obtained from *Trachylobium Hornemannianum* Hayne (Fam. Leguminosæ), found on the coast of East Africa. It is dug up by the natives and brought to Zanzibar, where it is prepared for the market by cleaning and sorting.

The resin occurs in pieces of very varying size and of pale yellow to deep reddish-brown or greenish-red colour. It is usually transparent or semi-transparent, the surface being warty, longitudinally striated, or smooth. Copal consists chiefly of trachylolic acid (80 per cent.), associated with *iso*trachylolic acid (4 per cent.), and copal resenes

(6 per cent.), together with volatile oil, a bitter principle, etc. Specific gravity, about 1·06.

Copal is entirely **soluble** in alcohol, but only partially in benzene, chloroform, glacial acetic acid, ether and oil of turpentine.

Varieties.—The term copal has been applied to a number of different resins, chiefly of fossil, but some of recent, origin. They are the product of very different plants, and have been obtained from different parts of the world. The chief and most important is Zanzibar copal, as described above. American copal, imported from Brazil and obtained from *Hymenœa Courbaril* Linn., is pale brown, transparent, brittle, and of agreeable odour. Specific gravity, 1·028 to 1·082. Australian copal, or gum kauri, is obtained from *Agathis australis* Steud., a tree growing in northern New Zealand. The greater part of the exported resin is fossil, and occurs in large pieces, of a pale yellow or greenish-yellow colour, with a conchoidal, vitreous fracture and a balsamic odour. Specific gravity, 1·062 to 1·109 or even higher. The finer specimens are occasionally used as amber substitutes. East Indian dammar is sometimes called Manila copal (see Dammara). West African copal is obtained from *Copaifera Guibourtiana* Benth.

Uses.—Copal is used principally in the manufacture of varnishes. For this purpose it is heated until frothing ceases, when linseed oil is added, the mixture again heated to about 260° and the thick liquid so produced dissolved in oil of turpentine. Under the name Gum Animi, it is occasionally ordered as an ingredient of plasters.

DAMMARA.—Dammar is a generic term for a number of different resins, of which East Indian or Singapore dammar is the only one that appears on the English market in quantity. East Indian dammar is derived from species of *Shorea*, *Hopea* and *Balanocarpus* (Fam. Dipterocarpaceæ), which are cultivated in the Eastern Archipelago. Dammar occurs in nodules 3 to 6 millimetres in diameter, but sometimes larger; the exterior is coated with white powder, while the interior is pale amber-coloured, transparent or translucent. It is readily friable and adheres only feebly on warming in the hand. It softens at about 100°, melts at about 150° to a clear liquid and ignites with difficulty. The fracture is conchoidal and vitreous, and usually exhibits air bubbles and vegetable debris. The odour is balsamic when the resin is fresh, but afterwards imperceptible. Specific gravity, 1·062 to 1·123. The yield of ash on ignition should be almost infinitesimal. Dammar is sometimes known as Manila copal or mastic. Rock dammar, obtained from *Shorea* species, is sometimes imported and closely resembles the above, but may be distinguished by its insolubility in 60 per cent. aqueous solution of chloral hydrate, in which all coniferous resins are soluble. Kauri resin is sometimes called New Zealand dammar (see Copal). Dammar is partly soluble in cold alcohol, moderately soluble in ether, soluble in boiling alcohol, fixed oils, oil of turpentine and other volatile oils, chloroform, carbon disulphide and light petroleum. Dammar consists mainly of a mixture of resenes (about 20 per cent.) and resin-acids, and also contains small quantities of a bitter principle and a volatile oil. The principal use of dammar is in the preparation of varnishes, but it is occasionally used as a constituent of plaster masses and as a microscopical mountant.

VENICE TURPENTINE.—Venice turpentine is the oleo-resin collected in South Tyrol from the larch, *Larix europea* DC. (Fam. Pinaceæ). A hole is bored into the trunk of the tree and the oleo-resin gradually fills the cavity. It is a viscid, yellowish, turbid fluid, entirely soluble in dehydrated alcohol. It does not harden readily on exposure to the air or when mixed with one-sixteenth of its weight of magnesia. It contains α- and β-larinolic acids (55 to 60 per cent.), resene (14 per cent.) and a volatile oil resembling turpentine (15 to 20 per cent.). The Venice turpentine of commerce is often a factitious substance prepared by dissolving colophony in oil of turpentine; it is darker in colour than the genuine substance. Venice turpentine is used in veterinary practice.

CORIANDRUM
(Coriand.)
Coriander

Synonyms—Coriandri Fructus; Coriander Fruit.

Coriander consists of the dried, ripe fruits of *Coriandrum sativum* Linn. (Fam. Umbelliferæ), an erect, herbaceous annual, indigenous to Southern Europe and naturalised throughout temperate Europe. It is cultivated chiefly in Russia, Central Europe, Northern Africa and India. The plant is cut when the fruits are ripe, and threshed.

The sub-globular cremocarps are from about 2 to 4 millimetres in diameter and are usually entire; they are glabrous, brownish-yellow or with a slight rose-tint; at the apex is a small stylopod and the remains of the calyx teeth; on each mericarp there are four straight, secondary ridges and five less conspicuous, undulating, primary ridges. The transversely cut surface shows in the dorsal part of the pericarp a continuous band of lignified sclerenchyma and, on the commissure, two, or rarely more, large vittæ; the oily endosperm is concave on the commissural surface. The drug has an aromatic odour and an agreeable, spicy taste.

The diagnostic **microscopical** characters are the lignified sclerenchyma of the mesocarp consisting of crossing layers of sinuous rows of pitted fusiform cells; the endosperm, composed of thick-walled, polygonal, cellulosic parenchyma containing fixed oil, aleurone grains and minute rosettes of calcium oxalate; the outer epidermis of the pericarp showing stomata and occasional prisms of calcium oxalate, although this epidermis may have been thrown off, exposing the inner parenchyma consisting of elongated, thin-walled, collapsed cells.

Coriander **contains** about 1 per cent. of volatile oil.

Standard, B.P.—Coriander contains not more than 2 per cent. of foreign organic matter. Ash, not more than 7 per cent. Acid-insoluble ash, not more than 1 per cent.

Coriander, in powder (Pulvis Coriandri : Pulv. Coriand.), contains the constituents and possesses the diagnostic microscopical characters of Coriandrum, and complies with the limits for ash and acid-insoluble ash of the unground drug.

Action and Uses.—The aromatic and carminative properties of coriander render it a suitable substance for addition to purgative medicines to prevent griping.

Dose.- 0·3 to 1 gramme (5 to 15 grains).

CORPUS LUTEUM
(Corp. Lut.)
Corpus Luteum

Synonyms—Corpus Luteum Siccum; Desiccated Corpus Luteum.

Corpus luteum is the material obtained by cleaning, drying and

powdering the corpora lutea taken from the ovaries of cows and sows. It occurs in the form of a brown powder for which tests for identity and purity have not yet been worked out. The corpus luteum is the yellow body which is formed in the cavity of the Graafian follicle after ovulation; it is composed of large, glandular cells containing lutein granules. The yellow colour is due to carotene. The corpora lutea of cows are often hollow and enclose a viscous fluid which contains oestrin. The corpus luteum is believed to secrete a hormone termed progestin, corporin, or lutin. The secretion of progestin inhibits oestrus, menstruation and ovulation during pregnancy, and causes thickening of the mucous membrane lining the uterus, in preparation for the embedding of the ovum. Progestin is slightly soluble in water, soluble with decomposition in alkalis, soluble in acetone, methyl alcohol, ethyl alcohol, ether, light petroleum and chloroform. It differs from ketohydroxyoestrin in its instability in alkalis. A second substance termed relaxin has also been obtained from corpora lutea of cows by extraction with acidified water. It is soluble in water, insoluble in acetone, ether, light petroleum and dehydrated alcohol; it is destroyed by heating above 50°, by formaldehyde, and by proteolytic enzymes. When injected into virgin guinea pigs during oestrus, it produces marked relaxation of the pelvic ligaments.

Action and Uses.—The action of corpus luteum given by the mouth is uncertain. It is prescribed in some cases of menorrhagia and hyperemesis gravidarum, and to prevent abortion. It may be administered in doses of 0·06 to 0·3 gramme (1 to 5 grains) of the desiccated powder in capsules or tablets. For intramuscular injection, 1 millilitre of a solution containing 0·02 gramme of soluble extract (equivalent to 0·06 to 0·18 gramme of corpus luteum), with sodium chloride, and chlorbutol as a preservative, may be administered at intervals of from one to four days. The effects of corpus luteum administration can often be obtained more satisfactorily by the use of the anterior pituitary-like hormone derived from urine of pregnancy.

CORYDALIS
(Coryd.)
Corydalis

Corydalis consists of the dried tubers of *Dicentra canadensis* Walp. (Squirrel Corn, Turkey Corn) and of *D. Cucullaria* Bernh. (Dutchman's Breeches) (Fam. Papaveraceæ), plants growing in the North-Eastern United States of America.

The drug is usually a mixture of the tubers from the two plants; those of *D. canadensis* occur singly and are spheroidal, being about 5 to 8 or up to 16 millimetres wide, and 3 to 5 or up to 8 millimetres high; the upper surface shows a slight depression with a scar, and the lower

surface is somewhat flattened, and has attached to it the dried remains of the very small, knotty rhizome; the almost smooth surface is minutely pitted or wrinkled and varies in colour from yellowish-grey to brownish-black, the lighter coloured tubers being somewhat translucent; the smoothed, transverse surface is yellowish in colour and starchy. The tubers of *D. Cucullaria* differ from those of *D. canadensis* by occurring in groups of about 3, attached to a small rhizome; in the drug, the groups are usually separated into individual tubers, which are about 1·5 to 5 or up to 12 millimetres wide, and 3 to 6 or up to 12 millimetres high; they are ovoid or ovoid with a flat side, or very broadly triangular-ovoid and have an acute apex, and the larger ones have the very small, knotty rhizome attached below. The drug has no odour and a very slightly bitter taste.

The diagnostic **microscopical** characters are the straight-walled epidermal cells; the lignified stone cells of various shapes, isodiametric or elongated, isolated or in groups of 2 to 4, and up to about 75 microns long; the starch grains, which are ovoid or ovoid-oblong, with striations and a hilum at the narrower end, 3 to 60 microns long; the very few small cluster-crystals of calcium oxalate.

The tubers of *D. canadensis* **contain** protopine, bulbocapnine, corydine and *iso*corydine, and *D. Cucullaria* contains cryptopine and two other crystalline alkaloids; the tubers of both contain about 25 per cent. of sucrose.

Action and Uses.—Corydalis is reputed to have tonic and diuretic properties and may be used in the form of a decoction.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

BULBOCAPNINA.—Bulbocapnine, $C_{19}H_{19}O_4N$, is one of the alkaloids occurring in the tubers of *Dicentra canadensis* and *Corydalis tuberosa*. It may be obtained by mixing the finely ground roots with lime and extracting with benzene. The mixture of alkaloids obtained after removal of the benzene is dissolved in alcohol and made just acid to congo-red with hydrochloric acid. The hydrochloride of bulbocapnine (melting-point, 270°) separates on standing. Bulbocapnine is precipitated from an aqueous solution of the hydrochloride by the addition of ammonia. It crystallises from alcohol in needles (melting-point, 199°.) It is insoluble in water, but readily soluble in chloroform. Bulbocapnine is administered in the form of tablets containing 0·1 gramme (1½ grains), or by the subcutaneous injection of a solution containing the same amount, in the symptomatic treatment of post-encephalitic conditions.

COTARNINÆ CHLORIDUM

(Cotarn. Chlorid.)

Cotarnine Chloride

$C_{12}H_{14}O_3NCl,2H_2O = 291·6$

Synonym—Cotarnine Hydrochloride.

Cotarnine chloride may be prepared by dissolving cotarnine in hydrochloric acid and evaporating the resulting solution, when the salt

crystallises out. It occurs as a pale yellow, crystalline powder, deliquescent in moist air and having a bitter taste. On dissolving 0·1 gramme in 3 millilitres of water and adding 3 drops of 15 per cent. sodium hydroxide solution, a turbidity is produced which disappears on shaking. From this clear solution the free base soon crystallises, especially on stirring with a glass rod. A solution of 0·2 gramme in 10 millilitres of distilled water yields, on the addition of N/10 iodine, a brown precipitate of cotarnine periodide which, when collected and dried over sulphuric acid, melts at 142° to 144°. When heated, cotarnine chloride yields a reddish-brown liquid, evolving characteristic disagreeable fumes, and gradually chars.

Readily **soluble** in water and in alcohol, forming yellow solutions; soluble in warm dehydrated alcohol and precipitated from the solution in a crystalline state by the addition of ether.

Standard.—Cotarnine chloride loses, on drying at 100°, not more than 12·5 per cent. of its weight. Ash, not more than 0·5 per cent. A 5 per cent. w/v solution in water is neutral to litmus.

Action and Uses.—The salts of cotarnine excite the isolated uterus and set up uterine contractions. The calibre of the arterioles is usually unchanged, and the coagulation time of the blood is not affected. The rational application of these compounds appears therefore to be limited to cases of uterine hæmorrhage. Cotarnine chloride is used as a styptic and has been recommended in all forms of uterine hæmorrhage, especially menorrhagia and the bleeding from uterine fibroids. Others regard it as a uterine sedative and use it to lessen the pain of dysmenorrhœa. Clinical reports on its action and value are often contradictory. It is used **externally** in the form of wool (30 per cent.) and gauze, or a 2 per cent. solution is applied on a tampon. The wool may be used to plug the nose in epistaxis, or to stop bleeding after tooth extraction. Bougies to check bleeding from the urethra may contain 0·03 gramme (½ grain) in each. Cotarnine chloride may be **administered** in powders, tablets, or cachets, or in aqueous solution, orally or hypodermically. Solutions for **injection** may be sterilised by tyndallisation, by filtration, or by heating at 100° for thirty minutes. The containers should comply with the tests for limit of alkalinity of glass, and the solution should be protected from light.

Dose.– 0·02 to 0·1 gramme (⅓ to 1½ grains).

COTARNINA.—Cotarnine, $C_{12}H_{15}O_4N$, is obtained by the oxidation of narcotine with nitric acid. It is a tertiary base, reacting with acids to give salts of the quaternary cotarnine hydroxide. It occurs in colourless needles melting at 132° to 135°, with decomposition. It is precipitated by tannic acid, ferrous salts, copper sulphate and other alkaloidal reagents. It is dissolved by concentrated nitric acid with the production of a red colouration and oxalic acid. The base is allied to hydrastinine and on reduction yields hydrocotarnine, $C_{12}H_{15}O_3N$. It is sparingly soluble in water, more soluble in alcohol and readily soluble in ether.

COTARNINÆ PHTHALAS.–Cotarnine phthalate is the acid phthalate of cotarnine. It occurs as a pale yellow, crystalline powder, melting at 113°. It is soluble in water (about 1 in 60) and contains about 59 per cent. of the base,

cotarnine. Cotarnine phthalate has been recommended for hæmaturia, given internally in similar doses to the chloride and used by irrigation (2 per cent. solution). Solutions for injection may be sterilised by tyndallisation, by filtration, or by heating at 100° for thirty minutes. The containers must comply with the tests for limit of alkalinity of glass, and the solution should be protected from light.

COTO
(Coto)
Coto

Synonym—Paracoto.

Coto is a bark of unknown botanical source derived from a large tree, probably a species of *Nectandra* (Fam. Lauraceæ). It is obtained from Bolivia. The formerly so-called true coto bark is no longer an article of commerce.

The bark occurs in flat or slightly curved, heavy pieces up to about 60 centimetres long, 6 centimetres broad, and 8 to 14 millimetres thick. The external surface has occasionally a whitish to brownish cork with longitudinal fissures and transverse cracks, or more usually a thin, smooth, brown cork layer, or exposed, smooth, cinnamon-brown cortex. The inner surface is somewhat coarsely striated with longitudinal ridges due to elongated groups of sclerenchymatous cells. The fracture is short and granular in the outer portion and coarsely fibrous in the inner portion, with projecting points of sclerenchyma. The smoothed, transverse surface of the soaked bark shows a paler brown, narrow zone of sclerenchyma just below the outer surface, and a wide, brown secondary phloem containing paler groups of sclerenchyma scattered through it. The odour is aromatic, camphoraceous and pungent, and the taste hot and biting. The bark originally imported as coto bark has a more nutmeg-like odour and a more peppery taste; under a lens the fractured surfaces glisten with minute crystals.

The diagnostic **microscopical** characters are the masses of stone cells with thick, stratified, pitted walls and narrow lumina, their long axes measuring about 280 microns, and set either tangentially or longitudinally; the oil cells alternating tangentially with collapsed sieve tissue; the cork cells, many of which are strongly thickened, lignified and pitted.

Coto **contains** paracotoin (dioxymethylenephenylcumalin), a crystalline bitter principle, which gives a yellow colour with nitric acid; other constituents are leucotin, hydrocotoin (benzoylphloroglucinol dimethylether), methylhydrocotoin, protocotoin, methylprotocotoin (oxyleucotin) and piperonylic acid. So-called true coto bark contains the substance originally named cotoin (benzoylphloroglucinol methylether), a crystalline powder, which yields a red colour with nitric acid, and leucotin (phenylcumalin). The substance now known as cotoin is paracotoin. Both barks also contain a little volatile oil, resin and tannin.

Action and Uses.—Coto is said to increase the appetite and the absorption of fluid by the intestinal mucosa, possibly by vasodilation. It is used as an astringent in the treatment of diarrhœa. It is **administered** as tincture and liquid extract, and may be prescribed with aromatic powder of chalk or chalk mixture.

Dose.– 0·06 to 0·5 gramme (1 to 8 grains).

Preparations

Extractum Coto Liquidum, B.P.C.—(Ext. Coto Liq.)—Liquid Extract of Coto. 1 in 1. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Tinctura Coto, B.P.C.—(Tinct. Coto)—Tincture of Coto. 1 in 10. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

COUMARINUM

(**Coumar.**)

Coumarin

$C_9H_6O_2 = 146{\cdot}1$

Coumarin, the lactone of coumaric acid, $C_6H_4(OH)\cdot CH:CH\cdot COOH$, is the odorous principle of the Tonka or Tonquin bean, *Dipteryx odorata* Willd., and *D. oppositifolia* Willd. (Fam. Leguminosæ). It may be prepared synthetically by heating salicylic aldehyde, acetic anhydride and anhydrous sodium acetate under a reflux condenser, cooling, and adding water to the crystalline mass obtained; the oily liquid which separates is distilled, and the coumarin obtained is dissolved in hot water and crystallised. It occurs in the form of colourless, prismatic crystals having a characteristic, persistent, fragrant odour and a bitter, aromatic taste. It commences to sublime at about 100° and boils at about 290°, without decomposition. On the addition of iodine solution to a saturated aqueous solution a brown, flocculent precipitate is produced which, on shaking, coagulates to a dark green mass, leaving a clear liquid. When fused with caustic potash it is converted into salicylic acid. It should be **stored** in amber-coloured bottles and protected from light.

Soluble in water (1 in 500) and boiling water (1 in 50); readily soluble in alcohol, ether (1 in 7), chloroform, fixed oils, volatile oils, and solutions of the alkali hydroxides.

Standard.—Coumarin melts between 68° and 70°. Ash, not more than 0·05 per cent. When warmed with alcoholic potassium hydroxide solution and a few drops of chloroform, no odour of phenyl isocyanide is produced (absence of acetanilide). 0·1 gramme dissolved in 1 millilitre of sulphuric acid forms a solution not darker than pale yellow (limit of readily carbonisable matter).

Action and Uses.—Coumarin has a powerful anæsthetic action, but readily causes vomiting and is, therefore, unsuitable for use as a

hypnotic. Applied directly to the mucous membrane, coumarin is extremely irritating and, after prolonged use, gives rise to an eczematous eruption. For this reason, care should be taken that the drug is not inhaled, when powdering it. Coumarin is used in perfumery, not only on account of its own fragrance, but for its property of fixing other odours. It is employed in pharmacy to disguise disagreeable odours, especially that of iodoform, for which purpose 1 part of coumarin is used with 50 parts of iodoform.

SODII COUMARAS.—Sodium *o*-coumarate in 22 per cent. solution has been used in treating cancerous growths, in doses of 1·5 millilitres (25 minims), injected into the diseased area.

CREOSOTI CARBONAS
(Creosot. Carb.)

Creosote Carbonate

Creosote carbonate is a mixture of the carbonic esters of the various constituents of creosote, namely creosol, guaiacol and cresol. It may be prepared by conducting a stream of carbonyl chloride (phosgene gas), into a solution of creosote in sodium hydroxide solution, washing the oily liquid which separates with weak alkali solution and then with water. It contains the equivalent of about 90 per cent. of creosote. It occurs in the form of a clear, colourless or amber-coloured, viscid liquid of about the consistence of syrup at ordinary temperatures, but more fluid when hot. It is neutral and has a very slight odour and a sweetish, oleaginous taste, suggesting, after a time, that of creosote. On standing in the cold, crystals of guaiacol carbonate separate, but these are redissolved on warming. On heating with 20 parts of alcoholic potassium hydroxide solution and cooling, a crystalline precipitate of potassium carbonate is formed.

Soluble in alcohol, ether, chloroform, benzene, amyl alcohol and volatile and fixed oils; insoluble in water and glycerin.

Standard.—Creosote carbonate has a specific gravity of 1·150 to 1·180. Ash, not more than 0·1 per cent. A solution in alcohol (1 in 5) is neutral to litmus paper, and no green colour develops on the addition of 1 drop of ferric chloride solution (limit of free creosote). Not darker than a light brown colouration is produced when mixed with about 10 times its volume of sulphuric acid (limit of readily carbonisable impurities).

Action and Uses.—Creosote carbonate passes through the stomach unchanged, but is decomposed with liberation of creosote by the alkaline intestinal secretions. It is, therefore, not an efficient substitute for creosote when it is desired to produce its effects in the stomach. It is employed chiefly in pulmonary tuberculosis, chronic bronchitis and pneumonia, and as an intestinal antiseptic. It may be conveniently

administered in warm milk or in capsules. Large doses, 4 millilitres (1 fluid drachm) or more, are sometimes given.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

CREOSOTUM

(Creosot.)

Creosote

Synonym—Creasote.

Creosote is a mixture of guaiacol, creosol and other phenols obtained by the fractional distillation of wood tar. It occurs as a colourless or pale yellow, highly refractive liquid with a strong, characteristic odour and a burning taste. On the addition of 1 drop of ferric chloride solution to 10 millilitres of a saturated aqueous solution of creosote, a transient violet-blue colour is produced. On the further addition of a few drops of ferric chloride solution, the liquid becomes cloudy, the colour changes through greyish-green to brown and a brown precipitate is produced. Creosote may be distinguished from coal-tar phenols by its neutral or faintly acid reaction to litmus and by the absence of a permanent coagulum when shaken with an equal volume of flexible collodion prepared with pyroxylin having the minimum viscosity specified in the British Pharmacopœia. It should be **stored** in well-closed bottles and protected from light.

Soluble in water (about 1 in 150); miscible with alcohol, ether, chloroform, glycerin, glacial acetic acid, fixed and volatile oils.

Standard, B.P.—Creosote has a specific gravity of not less than 1·070. It begins to distil at about 200° and not less than 95 per cent. v/v distils between 200° and 230°. It complies also with a limit test for hydrocarbons and bases.

Action and Uses.—Creosote is a powerful antiseptic, deodorant and antiputrescent; its action resembles that of phenol, but it is less irritating and poisonous. As an inhalation it is useful in phthisis, pulmonary gangrene and fœtid bronchitis. When taken by the mouth it promotes expectoration. In pulmonary tuberculosis with a secondary infection, creosote is undoubtedly useful, acting as a deodorant to the foul expectoration and perhaps converting the mixed infection into a simple tuberculous condition. It is therefore largely employed in pulmonary tuberculosis, although clinical opinion is divided as to its value. Guaiacol and guaiacol carbonate have now to some extent replaced creosote for this purpose. Creosote is carminative and, being a gastro-intestinal antiseptic, is useful in flatulent dyspepsia. **Externally,** it is used in parasitic skin diseases in the form of Unguentum Creosoti.

Creosote may be **administered** in solution in water, flavoured with spirit of juniper and liquid extract of liquorice, or as Syrupus Creosoti Compositus. Owing to its disagreeable taste, creosote may be given in

capsules; it should first be mixed with one and a half to two volumes of oil. Capsules are also made containing creosote in combination with cod-liver oil, or Emulsio Olei Morrhuæ et Creosoti may be given. Pills may be prepared with soap and liquorice as excipients. In phthisis and fœtid bronchitis, it may be inhaled from hot water (using 12 minims to 8 fluid ounces). A mixture of creosote with phenol and spirit of chloroform in equal parts, inhaled continuously during the day from an oro-nasal inhaler, has given good results in phthisis. Creosote is employed medicinally as an inhalation in whooping cough and other respiratory disorders, being vaporised in a suitable apparatus until the atmosphere of the sick-room is sufficiently saturated. When applied to carious teeth it is deodorant and antiseptic; it is also a local anæsthetic, allaying toothache.

Dose.– 0·12 to 0·6 millilitre (2 to 10 minims).

Preparations

Emulsio Olei Morrhuæ et Creosoti, B.P.C.—(Emuls. Ol. Morrh. et Creosot.)—Emulsion of Cod-liver Oil and Creosote. This emulsion contains 33·3 per cent. v/v of cod-liver oil, with 4 minims of creosote in each fluid ounce. Dose.– 8 to 30 millilitres (½ to 1 fluid ounce).

Syrupus Creosoti Compositus, B.P.C.—(Syr. Creosot. Co.)—Compound Syrup of Creosote. Each fluid drachm contains 1 minim of creosote with spirit of chloroform, glycerin, syrup of pine and syrup. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Unguentum Creosoti, B.P.C.—(Ung. Creosot.)—Creosote Ointment. Creosote, 10 per cent., in white beeswax, lard, and hard and soft paraffins.

This ointment, prepared with a basis of hard paraffin, 40 per cent., and white soft paraffin, 50 per cent., was included in the British Pharmacopœia, 1914.

CRESOL
(Cresol)
Cresol

Synonyms—Acidum Cresylicum; Cresylic Acid.

Cresol is a mixture of *o*-, *m*-, and *p*-cresols, $CH_3 \cdot C_6H_4 \cdot OH$, with xylenols and other homologues obtained from coal tar. It occurs as an almost colourless or pale brownish-yellow liquid, which darkens on keeping or on exposure to light and has a characteristic phenolic odour. A dilute aqueous solution gives a transient bluish colour on the addition of ferric chloride solution, and a pale yellow, flocculent precipitate on the addition of bromine water. *o*-Cresol is a colourless, deliquescent solid with a characteristic odour; it becomes yellow on keeping, melts at about 30° and boils at about 191°. *m*-Cresol is a colourless or yellowish liquid, slightly soluble in water, readily soluble in organic solvents; it has a melting-point of about 10° and a boiling-point of about 202°. *p*-Cresol is a crystalline solid, slightly soluble in water, readily soluble in

alcohol and ether; it has a melting-point of about 36° and a boiling-point of about 201°. Commercial cresylic acid, or "crude carbolic acid," has a specific gravity of about 1·04 and contains varying proportions of cresols with small proportions of phenol and higher phenols. Cresol should be **stored** in well-closed containers, away from light.

Almost completely **soluble** in water (1 in 50); miscible with alcohol (90 per cent.), ether, chloroform, glycerin, and fixed and volatile oils.

Standard, B.P.—Cresol forms a neutral aqueous solution and has a specific gravity of 1·035 to 1·050. Not more than 2 per cent. v/v distils below 188° and not less than 80 per cent. v/v between 195° and 205°. Residue on evaporation on a water-bath, not more than 0·1 per cent. w/v. It complies also with limit tests for hydrocarbons, volatile bases and sulphur compounds.

Action and Uses.—The effects produced by cresol are similar to those produced by phenol. It is useful as an inhalation in whooping cough, the atmosphere of the sick-room being impregnated with its vapour by means of a suitable apparatus. It has been **administered** as an antiseptic to the gastro-intestinal tract, usually diluted with olive oil and enclosed in gelatin or glutoid capsules. For **external** use, it may advantageously replace phenol in many preparations, such as lotions and ointments, since it is less caustic and less poisonous to mammals.

Cresol is employed largely as a disinfectant in the form of Liquor Cresolis Saponatus (lysol), which forms clear solutions with water. Crude cresol and higher fractions of coal tar distillates are also used in the manufacture of different types of disinfectants and in the preparation of liquids for agricultural and horticultural purposes such as sheep-dips and weed-killers. The "carbolic" powders of commerce contain crude cresol mixed with a siliceous base, but the disinfectant properties of such powders are almost negligible. In cases of **poisoning** by cresol or the higher homologues of phenol, the procedure described under Phenol should be followed.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

METHYLCYCLOHEXANOLUM.—Methylcyclohexanol, or hexahydrocresol, is a mixture of three isomeric secondary alcohols of the formula $C_7H_{14}O$, each of which can exist in stereoisomeric modifications. It is prepared by the hydrogenation of cresol and occurs as a somewhat toxic, oily liquid having a persistent, camphoraceous odour. It has a specific gravity of about 0·925 to 0·930, and a boiling-range of 160° to 180°. It is slightly soluble in water, and is used as a solvent in the manufacture of lacquers and varnishes.

METHYLCYCLOHEXANONUM.—Methylcyclohexanone, $C_7H_{12}O$, may be obtained from the cresols by catalytic hydrogenation and consists of a mixture of the three isomers. It occurs as a colourless oil with a peppermint-like odour and has a specific gravity of 0·925 to 0·930 and a boiling-range of 160° to 170°. It is used as a solvent in the manufacture of lacquers and varnishes.

METHYLCYCLOHEXANYLIS ACETAS.—Methylcyclohexanyl acetate, $CH_3{\cdot}COOC_7H_{13}$, is a mixture of the esters obtained by acetylating methylcyclohexanol. It has a specific gravity of about 0·94 to 0·98, and is used as a solvent.

METHYLCYCLOHEXANYLIS OXALAS.—Methylcyclohexanyl oxalate, $(COOC_7H_{13})_2$, occurs as a viscous, colourless, odourless liquid with a specific gravity of about 1·035 and is used as a plasticiser.

TRICRESYLIS PHOSPHAS.—Tricresyl phosphate, $(CH_3{\cdot}C_6H_4O)_3PO_4$, occurs in commerce as the tri-ortho compound which is a crystalline solid when pure, melting at 18°, but usually occurs as a liquid owing to the presence of small quantities of other isomerides. It has a specific gravity of about 1·177 to 1·180 and a boiling-range of 430° to 440°. It is extensively used as a plasticiser in the manufacture of lacquers and varnishes.

Preparations

Liquor Cresolis Saponatus, B.P.—(Liq. Cresol. Sap.)—Solution of Cresol with Soap. *Syn.*—(For general use in Great Britain and Northern Ireland only) Lysol. It contains 50 per cent. v/v of cresol in a saponaceous solvent (limits, 47 to 53) and is miscible with water in all proportions. It may be prepared by dissolving cresol in linseed oil saponified with potassium hydroxide. The 5 per cent. v/v aqueous solution shows no opalescence on standing for not less than three hours. It complies also with limit tests for alkali and sulphur compounds, and the separated cresol complies with limit tests for hydrocarbons and volatile bases.

A similar preparation was included in the British Pharmaceutical Codex, 1923, *under the name of Liquor Cresolis Glycerinatus*.

Vapor Cresolis Compositus, B.P.C.—(Vap. Cresol. Co.)—Compound Cresol Inhalation. Creosote, 1 per cent. v/v, and oils of eucalyptus and Siberian fir, of each 2 per cent. v/v, in cresol.

CRETA

(Cret.)

Chalk

$CaCO_3 = 100{\cdot}1$

Synonym—Creta Præparata; Prepared Chalk.

Chalk is native calcium carbonate freed from most of its impurities by elutriation. It occurs in white or greyish-white, friable masses or powder, without odour or taste. When examined microscopically it is seen to consist of the entire and broken tests of cretaceous foraminifera such as *Globigerina* (about 35 by 30 to 140 by 115 microns) and *Textularia* (about 50 by 40 to 175 by 110 microns), and minute rounded, ovoid or flattened bodies named morpholites (about 10 to 15 microns in diameter).

Insoluble in water and alcohol (90 per cent.).

Standard, B.P.—Chalk contains not less than 97 per cent. of $CaCO_3$, calculated on the substance dried at 100°. Loss on drying at 100°, not more than 1 per cent. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. When boiled with water, the filtrate is neutral to litmus. It complies also with limit tests for aluminium, iron, phosphate and matter insoluble in hydrochloric acid, chloride and sulphate.

Action and Uses.—Chalk is astringent and antacid. For diarrhœa it is administered as Mistura Cretæ or Mistura Cretæ Composita,

or with aromatics in the form of Pulvis Cretæ Aromaticus, with or without opium. A mixture formerly known as Board of Health cholera mixture closely resembled Mistura Cretæ Composita and was used in the same manner. As an antacid, chalk is largely employed with bismuth carbonate, magnesium carbonate and sodium bicarbonate in the treatment of gastric and duodenal ulcer. **Externally,** it is protective and mildly astringent, occasionally being used as a dusting powder with zinc oxide or calamine, or as Unguentum Cretæ, for eczema and burns.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

Preparations

Mistura Cretæ, B.P.C.—(Mist. Cret.)—Chalk Mixture. Each fluid ounce contains about 13 grains of chalk, with sucrose, tragacanth and cinnamon water. Dose.– 15 to 30 millilitres (½ to1 fluid ounce).

This mixture was included in the British Pharmacopœia, 1914.

Mistura Cretæ Composita, B.P.C.—(Mist. Cret. Co.)—Compound Chalk Mixture. Each fluid ounce contains 9 grains of aromatic powder of chalk, 9 grains of chalk, 30 minims of tincture of catechu and 3 minims of tincture of opium, with sucrose, aromatic spirit of ammonia, compound tincture of cardamom, tragacanth and cinnamon water. Dose.– 30 millilitres (1 fluid ounce) for an adult; 15 millilitres (½ fluid ounce) for a child twelve years old; 8 millilitres (2 fluid drachms) for a child seven years old.

Pulvis Cretæ Aromaticus, B.P.—(Pulv. Cret. Aromat.)—Aromatic Powder of Chalk. Chalk, 25 per cent., with cinnamon, nutmeg, clove, cardamom and sucrose. Dose.– 0·6 to 4 grammes (10 to 60 grains).

Pulvis Cretæ Aromaticus cum Opio, B.P.—(Pulv. Cret. Aromat. c. Opio)—Aromatic Powder of Chalk with Opium. Powdered opium, 2·5 per cent., with aromatic powder of chalk. It contains 0·25 per cent. of anhydrous morphine (limits, 0·235 to 0·265); 4 grammes contains 0·01 gramme, and 60 grains about ¼ grain, of anhydrous morphine. Dose.– 0·6 to 4 grammes (10 to 60 grains).

Unguentum Cretæ, B.P.C.—(Ung. Cret.)—Chalk Ointment. Chalk, 20 per cent., in spermaceti ointment.

CROCUS
(Croc.)
Saffron

Saffron consists of the dried stigmas and tops of the styles of *Crocus sativus* Linn. (Fam. Iridaceæ), a plant cultivated in Spain, and to a less extent in France and Italy. It should be **stored** in well-closed containers and protected from light.

The drug occurs in red or reddish-brown, tangled masses, composed of single stigmas or one to three stigmas attached to a portion of the yellow style. The stigmas are hollow, narrowly obconical and partially split longitudinally on the inner side; they are about 25 millimetres long and 4 millimetres wide at the upper end, which is irregularly notched; the free margin bears cylindrical, stigmatic papillæ up to 150 microns long. When quite dry, saffron is brittle to the touch; when damp, it is more or less flexible. Saffron has a strong aromatic odour, which is

intensified when the drug is damped and warmed; the taste is slightly bitter, and is characteristic. When saffron is placed in concentrated sulphuric acid a deep blue colour develops. When calculated on the dried drug, the water-soluble extractive is about 58 per cent., which is invariably lower than the alcohol extractive (alcohol, 60 per cent.) on the same sample; the total reducing sugar, after inversion, calculated as dextrose, is about 25 per cent. and the total nitrogen about 2·3 per cent.

Saffron **contains** about 1 per cent. of volatile oil, a colourless, bitter glycoside, picrocrocin, and crocin or polychroite, the glycoside of the colouring matter, crocetin. The latter appears to be a mixture of three substances, α-, β- and γ-crocetins. Crocin is an amorphous red powder and, like carotene, dissolves in concentrated sulphuric acid, forming a deep blue solution which on standing changes to violet, red and finally brown; it is coloured green by nitric acid.

Standard.—Saffron contains not more than 8 per cent. of styles and anthers, and not more than 2 per cent. of foreign organic matter. Alcohol extractive (alcohol, 60 per cent.), calculated on the dried drug, not less than 60 per cent. Ash, not more than 7·5 per cent. Light petroleum extractive, not more than 1 per cent. Moisture, not more than 12·5 per cent. 0·02 gramme of saffron yields to 100 millilitres of water a yellow colour similar in tint to, and not less in intensity than, that of 0·1 per cent. w/v potassium dichromate solution. The taste is devoid of any trace of sweetness.

Uses.—Saffron is used almost entirely for its colouring and flavouring properties. Syrupus Croci, which has a brilliant colour when fresh, but deposits on keeping, and Glycerinum Croci are used as colouring agents. A tincture [Tinctura Croci, 1 in 5 in alcohol (60 per cent.)] is also used as a colouring agent. Saffron preparations as colouring agents are now largely replaced by dyes such as tartrazine and orange G; Liquor Tartrazinæ Compositus is suitable for general pharmaceutical use.

MAIDIS STIGMATA.—Maize stigmas, or corn silk, consists of the fresh or dried stigmas and styles obtained from *Zea Mays* Linn. (Fam. Graminaceæ), an annual plant indigenous to tropical America, but widely cultivated in tropical and temperate regions. It occurs as a loose, tangled mass of slender, yellowish or brownish, filamentous styles from 5 to 20 centimetres long, having slender, bifid stigmas 0·5 to 3 millimetres long. The chief constituents are resin and maizenic acid. Maize stigmas are rarely used in medicine, but a liquid extract (Extractum Maidis Liquidum, 1 in 1; dose, 1 to 2 fluid drachms), and a syrup [Syrupus Maidis, 1 (liquid extract) in 10; dose, ¼ to ½ fluid ounce] were formerly employed and were considered to possess demulcent and diuretic properties.

Preparations

Glycerinum Croci, B.P.C.—(Glycer. Croc.)—Glycerin of Saffron. Saffron, 1 in 40, in glycerin and alcohol (60 per cent.).

Syrupus Croci, B.P.C.—(Syr. Croc.)—Syrup of Saffron. Glycerin of saffron, 1 in 8, in syrup. Dose.—As a colouring and flavouring agent, 4 millilitres (1 fluid drachm) to 30 millilitres (1 fluid ounce) of mixture.

CUBEBA
(Cubeb.)
Cubeb

Synonyms—Cubebæ Fructus; Tailed Pepper.

Cubeb consists of the dried, fully-grown, unripe fruits of *Piper Cubeba* Linn. (Fam. Piperaceæ), a plant indigenous to the Malay Archipelago. It is collected when green, stripped from the rachis and dried in the sun.

The dried fruits are blackish in colour, with a greyish bloom, nearly globular in shape, sometimes depressed at the base and about 4 millimetres in diameter. The pericarp is reticulately wrinkled; at the apex it bears a tri-radiate stigma and at the base it is abnormally prolonged into a slender, firmly attached stalk about 4 millimetres in length; it contains a single seed. The odour is strong, spicy and characteristic; the taste is strong, spicy and somewhat bitter. When the powdered fruit is sprinkled on the surface of 80 per cent. sulphuric acid, each particle becomes surrounded by a crimson zone.

The diagnostic **microscopical** characters are the single (only here and there double) row of radially elongated, rectangular, sclerenchymatous cells in the inner layer of the pericarp; the brown cells of the outer epidermis containing small prisms of calcium oxalate; the hypodermis consisting of small groups of rectangular stone cells separated by thin-walled parenchyma; the parenchyma of the mesocarp containing rounded starch grains and prisms of calcium oxalate; the large oil cells from the mesocarp and also from the perisperm of the seed (these are often broken in the powder); the large, polygonal, thin-walled cells of the perisperm filled with polyhedral starch grains; the reddish-brown cells of the seed coat crossed by the cells of the hyaline layer; the absence of beaker-cells.

Cubeb **contains** from 10 to 18 per cent. of volatile oil. It also contains resins, cubebic acid (0·96 per cent.) which is amorphous and gives a cherry-red colour with sulphuric acid, and cubebin which is colourless and crystalline and gives a crimson colour with sulphuric acid.

Substitutes.—Cubeb is liable to admixture with a number of fruits more or less similar in appearance. They can be distinguished by their different structure and by their not giving a crimson colour with sulphuric acid. Amongst the commoner admixtures are the following:—"Rinœ Badak," a false cubeb, greyish in tint and larger in size (about 6 millimetres in diameter) than true cubeb; it has a mace-like odour; the epicarpic stone cells are larger than those of genuine cubeb. When cubeb containing an admixture of these fruits is used, it is liable to cause symptoms of poisoning. The fruits of *Piper crassipes* Korthals are 4 to 7 millimetres in diameter, the pedicels 7 to 11 millimetres long, and the base of the fruit is depressed; they have a very bitter taste and an odour different from cubeb. *Piper ribesioides* Wallich., the fruits of which are 4 to 6 millimetres in diameter, the pedicels about 6 millimetres long, the colour yellowish or brownish-grey and the taste less pungent than true cubeb. *Piper mollissimum* Blume (Kebœ Cubeb), the fruits of which are 4 to 7 millimetres in diameter, the pedicels about 16 millimetres long, coarsely wrinkled and grey in tint. *Piper venosum* C. DC. and *Piper muricatum* Blume both have

fruits larger than true cubeb but the pedicels are short or absent. The fruits of *Piper Lowong* Blume resemble true cubeb in appearance but, as in those of *P. mollissimum*, stone cells are absent from the endocarp.

Standard.—Cubeb contains not more than 7 per cent. of shrivelled, immature fruits, rachis and stems, and not more than 2 per cent. of other foreign organic matter. Ash, not more than 8 per cent.

Cubeb, in powder (Pulvis Cubebæ : Pulv. Cubeb.), contains the constituents and possesses the diagnostic microscopical characters of Cubeba, and complies with the limit for ash of the unground drug.

Action and Uses.—Cubeb has an action similar to but weaker than that of copaiba. It is used internally as an antiseptic and diuretic in gonorrhœa and in the form of lozenges as a stimulating and antiseptic expectorant to the bronchial mucous membrane.

Dose.– 2 to 4 grammes (½ to 1 drachm).

Preparations

Extractum Cubebæ Liquidum, B.P.C.—(Ext. Cubeb. Liq.)—Liquid Extract of Cubeb. 1 in 1. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Oleoresina Cubebæ, B.P.C.—(Oleores. Cubeb.)—Oleoresin of Cubeb. The ether-soluble matter of cubeb. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Tinctura Cubebæ, B.P.C.—(Tinct. Cubeb.)—Tincture of Cubeb. 1 in 5. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

CUCURBITA
(Cucurb.)
Melon Pumpkin Seed

Synonym—Cucurbitæ Semina Præparata.

Melon pumpkin seed consists of the fresh seeds of *Cucurbita maxima* Duchesne (Fam. Cucurbitaceæ), a native of the Levant and cultivated on the shores of the Mediterranean.

The seeds are ovate in shape and flat, measuring from 8 to 12 millimetres in length, 9 to 12 millimetres in breadth and about 4 millimetres in thickness; they have a flat ridge and shallow groove round the edge; the testa is light brown to white in colour, brittle and finely pitted. The embryo consists of two white, oily, easily separable cotyledons, with a short radicle. When fresh, the seed has a faint odour and a slight taste. For medicinal purposes the testa and tegmen are removed, and the seed should not be used if more than a month old.

Melon pumpkin seed **contains** about 30 per cent. of a reddish fixed oil, protein, sugar, starch and an acrid resin.

Action and Uses.—Melon pumpkin seed has been employed as a tænicide. Its use should be preceded by the administration of a saline purge. The patient fasts and takes about 100 grammes (3 ounces)

of bruised seed, mixed with a little water or milk to a creamy consistence, as a single dose. After an interval of a few hours a purgative dose of castor oil is given. Experiment has failed to indicate that either the oil or resin has any definite action as a vermifuge; no substance of physiological activity has been isolated either from the kernels or shells of the seed.

CUMINUM
(Cumin.)

Cummin

Cummin is the fruit of *Cuminum Cyminum* Linn. (Fam. Umbelliferæ), a small plant indigenous to the Upper Nile territory, and cultivated in Northern Africa, Sicily, Malta and India. The plants are cut and threshed when the fruit is ripe.

The fruit is a cremocarp, brown in colour with lighter-coloured ridges. It is of an elongated oval shape, about 4 to 6 millimetres long, tapering onwards both base and apex. The mericarps are generally separate. Each mericarp has five longitudinal, hairy primary ridges running from base to apex; alternating with these are secondary ridges which are flatter and bear conspicuous emergences. The odour and taste are characteristic, slightly resembling those of anise, but much less agreeable. Microscopically, the transverse section of the mericarp exhibits an oily endosperm and six vittæ, four being on the dorsal surface and two on the commissural surface; the large pluriserial hairs are characteristic.

Cummin **contains** from 2 to 4 per cent. of a volatile oil which contains 25 to 40 per cent. of cuminic aldehyde (cuminal). It yields about 8 per cent. of ash.

Standard.—Cummin contains not more than 2 per cent. of foreign organic matter.

Action and Uses.—Cummin is used as a carminative, chiefly in spices and veterinary medicine.

CUPRI NITRAS
(Cupr. Nit.)

Copper Nitrate

$Cu(NO_3)_2,3H_2O = 241{\cdot}6$

Synonym—Cupric Nitrate.

Copper nitrate may be prepared by dissolving copper or copper oxide in nitric acid and crystallising at a temperature not below 26°. Crystallised below 21°, the hexahydrate is formed, which is deeper in colour and dissolves in its water of crystallisation at about 25°. It occurs in the

form of a deliquescent, blue, crystalline powder, or sometimes in larger blue crystals. Melting-point, about 115°. It decomposes on heating, becoming basic. The salt has strong oxidising properties. It readily unites with ammonia, amino-acids, aniline, etc., forming complex salts. It should be **stored** in well-stoppered bottles.

Very **soluble** in water and alcohol.

Action and Uses.—Copper nitrate is a powerful oxidising agent. It may be used as a substitute for the sulphate in astringent lotions.

CUPRI CITRAS.—Copper citrate is used in the form of a 5 per cent. ointment in the treatment of ophthalmic ulcerations and trachoma.

CUPRI OLEAS

(Cupr. Oleas.)

Copper Oleate

Copper oleate is prepared by dissolving 1 part of copper sulphate and 2·5 parts of hard soap separately, each in 50 parts of distilled water, mixing the two solutions and heating till the precipitate melts and agglomerates; the product is then washed with boiling water, collected and dried. It occurs in dark green or greenish-blue masses or powder, and contains the equivalent of about 12 per cent. of CuO.

Insoluble in water; soluble in ether.

Action and Uses.—Copper oleate is used as Unguentum Cupri Oleatis, an astringent, antiseptic and parasiticide ointment recommended especially for ringworm.

Preparation

Unguentum Cupri Oleatis, B.P.C.—(Ung. Cupr. Oleat.)—Copper Oleate Ointment. Copper oleate, 12·5 per cent., in yellow soft paraffin.

CUPRI SUBACETAS

(Cupr. Subacet.)

Basic Copper Acetate

Synonyms—Copper Oxyacetate; Verdigris.

Basic copper acetate may be prepared by arranging in alternate layers copper sheets and grape residue undergoing acetous fermentation, or flannel saturated with hot acetic acid. The crust of the acetate is detached from the plates and sold in cakes, either dry or containing 30 to 40 per cent. of water. The composition of the salt varies, but approaches $Cu(C_2H_3O_2)_2,Cu(OH)_2,5H_2O$. It forms blue needles or scales which effloresce in air and become green owing to loss of water,

and occurs in commerce as a greenish-blue powder, or in heavy, hard masses of a greenish-blue colour, containing considerable quantities of small crystals, and having an earthy, somewhat crystalline fracture and a slight acetous odour. It is decomposed by heat with the evolution of acetic acid and water. When it is treated with the requisite proportion of arsenic trioxide solution, Schweinfurth's green $Cu(C_2H_3O_2)_2$, 3 $CuAs_2O_4$, is formed. Dissolved in acetic acid, it is converted into the normal acetate, $Cu(C_2H_3O_2)_2,H_2O$, which is known as "distilled" or "crystallised" verdigris.

Partially **soluble** in water, with decomposition; insoluble in alcohol; completely soluble in excess of ammonium carbonate solution.

Action and Uses.—Basic copper acetate has been employed as an escharotic, but is used chiefly in veterinary medicine. Linimentum Æruginis (liniment of verdigris) was prepared by dissolving verdigris in vinegar, adding honey and boiling down to a proper consistence; it has been used as an application to indolent ulcers, but is now rarely employed.

CUPRI SULPHAS

(Cupr. Sulph.)

Copper Sulphate

$CuSO_4,5H_2O = 249{\cdot}7$

Copper sulphate is cupric sulphate, and may be prepared from copper pyrites, or by the action of sulphuric acid on copper or copper oxide. It occurs in blue, triclinic prisms or as a blue, crystalline powder, and is slowly efflorescent in dry air. The names blue vitriol, blue copperas, and blue stone are sometimes used for crude copper sulphate. The exsiccated salt is nearly colourless, and is sometimes used to detect the presence of water in alcohol and other liquids.

Soluble in water (about 1 in 3) and glycerin (about 1 in 3), almost insoluble in alcohol (90 per cent).

Standard, B.P.—Copper sulphate contains not less than 98·5 per cent. and not more than the equivalent of 101 per cent. of $CuSO_4$, $5H_2O$. Arsenic limit, 10 parts per million. It complies also with limit tests for acidity, zinc, lead and iron.

Action and Uses.—The soluble salts of copper precipitate proteins from solution and are therefore astringent—or, in strong solutions, corrosive—when applied to the mucous surfaces. Large doses irritate the stomach and intestines and give rise to violent vomiting and purging. Copper sulphate is given **internally** as an emetic; for this purpose a 1 per cent. solution is suitable. Its action is prompt, very little of the salt being absorbed. It is of great value in phosphorus poisoning, where it not only acts as an emetic, but, by forming an insoluble copper phosphide, prevents absorption. It is also used

internally as an astringent, in small doses administered in pill form. Small doses are administered in conjunction with iron in cases of secondary anæmia. **Externally**, copper sulphate is used in solid form as a caustic application to warts and ulcers. Sticks of the salt are prepared for this purpose and are mounted in boxwood holders for gynæcological use. Copper sulphate is a useful astringent and antiseptic for application to discharging gums in pyorrhœa alveolaris. Dilute solutions of copper sulphate are used for their effect upon mucous membranes in checking excessive discharges. For ophthalmic use, 0·25 to 0·5 per cent. w/v solutions are suitable; for urethral injections, 0·5 to 1 per cent. w/v solutions. A 2 per cent. w/v solution is employed by ionisation for ringworm, alopecia, etc.

Copper sulphate is used in the preparation of Benedict's, Fehling's, and Pavy's solutions for the detection and determination of dextrose in urine and other fluids, and for the determination of carbohydrates in general analytical work. The salt is a powerful fungicide, and its use in minute quantity has been suggested to prevent the growth of algæ in reservoirs. It is also largely used as a seed dressing and for preventing the growth of certain weeds. Copper sulphate is **incompatible** with alkalis, iodides and vegetable astringents. The best emergency antidote for **poisoning** by salts of copper is white of egg with milk, morphine being given to allay pain.

Dose.– 0·016 to 0·12 gramme (¼ to 2 grains); as an emetic, 0·3 to 0·6 gramme (5 to 10 grains).

CURARA

(Curar.)

Curare

Synonyms—Woorara; Woorali; Ourari; Urari.

Curare consists of an extract prepared from the bark of *Strychnos toxifera* Schomb. and other species of *Strychnos* (Fam. Loganiaceæ), liana-like plants growing in British Guiana, French Guiana, Venezuela, Northern Brazil, and Colombia. It is probably prepared by the evaporation of an aqueous decoction or infusion.

Curare varies considerably in appearance and composition. It may occur as a brittle, blackish extract, often containing small cavities. When imported in bamboo, it is dark brown and granular, and frequently exhibits small crystals. When a small fragment is mixed with alcohol and viewed under the microscope, the brownish fluid shows crystals in the form of four-sided prisms (possibly curarine) and minute crystals of calcium oxalate. Curare is without odour, but has a very bitter taste.

The constituents of the drug vary in the different specimens. Gourd curare **contains** the poisonous alkaloid, curarine, $C_{19}H_{26}ON_2$, which

has been obtained as a yellowish-brown powder having a bitter taste; curine, which is less poisonous than curarine, has also been obtained from gourd curare; it is identical with beberine, $C_{36}H_{38}O_6N_2$, the alkaloid from nectandra bark. Bamboo (tube) curare from the Amazon contains the alkaloids, tubocurarine, $C_{19}H_{21}O_4N$, and curine, and pot curare contains the alkaloids, protocurarine, protocurine and protocuridine. Bamboo curare yields about 84 to 88 per cent. to water, gourd curare, 34 to 75 per cent. and pot curare, 50 to 87 per cent.

Action and Uses.—The principal effect of curare is to paralyse the motor nerve-endings in striped muscle; voluntary movements are arrested and death occurs from respiratory failure. Curare acts promptly when introduced subcutaneously, but is almost inert when taken by the mouth, probably owing to its rapid excretion and to the destructive action of the gastric juice. It has sometimes been **administered** in doses of $\frac{1}{20}$ to $\frac{1}{2}$ grain by hypodermic injection in the treatment of tetanus, hydrophobia, and strychnine poisoning. It is used as an arrow-poison by the natives of South America.

CURCUMA
(Curcum.)
Turmeric

Synonyms—Turmeric Rhizome; Turmeric Root.

Turmeric is the dried rhizome of *Curcuma domestica* Val. (Fam. Zingiberaceæ), a native of Southern Asia and largely cultivated in India, China, Java and other tropical countries. The rhizomes are dug up after the herbaceous aerial stems have died down and are then steamed or boiled. They are finally dried and sorted into "bulbs," the stem-producing rhizomes, and "fingers," the lateral, secondary rhizomes. The tinctorial value of the "finger" variety is higher than that of the "bulb."

"Finger" turmeric occurs in nearly straight, sub-cylindrical, hard, heavy, compact pieces, 4 to 7 centimetres long and 1 to 1·5 centimetres wide at the broadest part, bluntly tapering at each end. The outer surface of the rhizome is of a deep yellowish-brown colour, longitudinally wrinkled, and bears transverse rings of leaf-scars. Some pieces have short, lateral branches, or show the scars where these have been broken off. The fracture is short, the broken surface being brownish-yellow, waxy and horny. The transversely cut surface exhibits a paler coloured endodermis; the stele shows numerous, scattered vascular bundles. "Bulb" turmeric resembles "finger" turmeric, but is shorter and thicker. When a piece of filter paper impregnated with an alcoholic extract of turmeric is dried and then moistened with a solution of boric acid slightly acidified with hydrochloric acid and again dried, the filter paper assumes a pink or brownish-red colour which becomes

deep blue or greenish-black on the addition of alkali. The odour and taste are aromatic and characteristic, and, when chewed, turmeric colours the saliva yellow.

The diagnostic **microscopical** characters are the abundant, large, yellow-tinted parenchymatous cells in which are irregular, yellow masses of gelatinised starch, some grains still exhibiting the characteristic scitaminaceous type and varying in length from 30 to 60 microns; the epidermis, bearing occasional, thick-walled, unicellular trichomes, and beneath it a layer of cork composed of thin-walled cells; the oil cells and cells containing orange-coloured lumps of resin; the vascular bundles, which are not accompanied by a sheath of sclerenchymatous fibres.

Turmeric **contains** curcumin, a yellow, crystalline body, and about 5 per cent. of a volatile oil. The rhizome also contains starch and resin, some of the starch being gelatinised owing to the method by which the drug is prepared. Curcumin dissolves in alcohol to form a deep yellow solution, alkalis changing the colour to reddish-brown. It yields to alcohol (90 per cent.) about 8 per cent. of extractive.

Standard.—Turmeric yields not more than 9 per cent. of ash.

Turmeric, in powder (Pulvis Curcumæ : Pulv. Curcum.), contains the constituents and possesses the diagnostic microscopical characters of Curcuma, and complies with the standard for the unground drug.

Action and Uses.—Turmeric is an aromatic, used principally as a constituent of curry powders and other condiments. Tincture of turmeric (Tinctura Curcumæ, 1 in 6) is used as a colouring agent, but the colour is fugitive in solution. Turmeric paper is prepared by steeping unglazed white paper in the tincture, and drying it.

ZEDOARY is the rhizome of *Curcuma Zedoaria* Roscoe (Fam. Zingiberaceæ). It is cultivated in India, the rhizome usually being cut into transverse slices and dried. The slices are greyish or yellowish and resemble turmeric in general structure, but contain no curcumin; the starch grains are characteristic. The odour and taste resemble those of ginger, but are less powerful. Zedoary contains resin, about 1 per cent. of volatile oil, and starch.

CUSPARIA

(Cuspar.)

Cusparia

Synonyms—Angostura Bark; Cusparia Bark.

Cusparia is the bark obtained from *Galipea officinalis* Hancock (Fam. Rutaceæ), a tree growing abundantly on the mountains of Colombia and Venezuela.

The bark occurs in quills or in thin, curved or channelled pieces, often about 10 to 12 or up to 30 centimetres long, 2·5 centimetres wide and 2 millimetres thick. The outer corky layer is either grey and firmly adherent, or buff, spongy and easily removed by the finger-nail.

The inner surface is light brown, finely striated and usually laminated, and, under a lens, exhibits numerous short, longitudinal, whitish lines (calcium oxalate crystals). The fracture is short and resinous. A smoothed, transverse section shows a thin, buff or grey cork, a pale brown cortex with scattered, whitish, calcium oxalate cells and narrow, brown, radial strips of phloem containing darker brown patches of fibres, separated by paler medullary rays which widen out slightly towards the cortex. It gives a red colour with ferric chloride solution. The taste is bitter.

The diagnostic **microscopical** characters are the small sclerenchymatous cells from the cork and the phelloderm; in the cortex, the elongated cells filled with acicular crystals of calcium oxalate; the scattered, isolated or grouped, phloem fibres; the secretion cells; the numerous narrow cells, each containing one longitudinally elongated, prismatic crystal of calcium oxalate (up to 120 microns long); the medullary rays, 2 cells wide in the inner part, widening outwards; the small, rounded starch grains about 3 to 10 microns in diameter.

Cusparia **contains** the bitter principle angosturin, a colourless, crystalline substance which is readily soluble in water, alcohol and ether. The bark also contains about 2·4 per cent. of the bitter, crystalline alkaloids, cusparine, galipine, galipoidine, and a fourth which awaits investigation. Cusparidine and cuspareine, alkaloids previously reported to be present, are probably mixtures of galipine and cusparine. About 1 per cent. of volatile oil and a glycoside, which yields a fluorescent substance when hydrolysed by heating with dilute sulphuric acid, are also present.

Substitutes.—Cusparia has been adulterated with nux vomica bark, which is different in appearance and distinguishable by the transverse section, which exhibits under the lens a distinct paler line of sclerenchymatous cells, separating the cortex from the phloem. This line of cells is never found in cusparia, which seldom contains any sclerenchymatous tissue, other than small isolated groups of bast fibres. Its characteristic structure serves to distinguish cusparia from other adulterants, such as copalchi bark (*Croton niveus* Jacq.), and Brazilian angostura bark (*Esenbeckia febrifuga* A. Juss.).

Standard.—Cusparia contains not more than 2 per cent. of foreign organic matter. Ash, not more than 7 per cent.

Cusparia, in powder (Pulvis Cuspariæ : Pulv. Cuspar.), contains the constituents and possesses the diagnostic microscopical characters of Cusparia, and complies with the limit for ash of the unground drug.

Action and Uses.—Cusparia is an aromatic bitter and is administered as an infusion. It is a constituent of "Angostura bitters," which also contains cinchona and other bitter substances.

Preparation

Infusum Cuspariæ Concentratum, B.P.C.—(Inf. Cuspar. Conc.)—Concentrated Infusion of Cusparia. 1 in 2½. When infusion of cusparia or Infusum Cuspariæ is prescribed, this concentrated infusion diluted with seven times its volume of distilled water may be dispensed. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

CUSSO
(Cuss.)
Kousso

Kousso consists of the dried panicles of the fertilised, pistillate flowers of *Brayera anthelmintica* Kunth (Fam. Rosaceæ), a tree indigenous to North-Eastern Africa, and cultivated in Abyssinia.

The panicles are from 30 to 50 centimetres long, usually bound with a flexible stem and known in commerce as "hanks"; they have a characteristic dull reddish colour. The numerous branches, which are more or less covered with glands and shaggy hairs, are axillary to large bracts and bear many shortly-stalked flowers. "Loose kousso" consists of the broken panicles. The pistillate flower shows a cup-shaped, coarsely hairy receptacle, bearing upon its rim an epicalyx of 5 spreading sepals about 1 centimetre long, with prominent reddish or purplish veins, an inconspicuous inner calyx of brownish, shrivelled sepals bent inwards over a ring of aborted stamens, the corolla being caducous. One or two shrivelled, apocarpous carpels, with protruding styles and enlarged stigmas, are present. The odour is not marked, and the taste is bitter and acrid.

The diagnostic **microscopical** characters are the abundant, thick-walled, more or less lignified, frequently waved or curved, unicellular trichomes from the bracts, epicalyx and calyx, from 30 to 1200 microns long and from 6 to 20 microns wide; the unicellular, spherical heads, about 40 to 60 microns in diameter, of stalked, glandular trichomes; the small-celled parenchyma with numerous cluster-crystals of calcium oxalate, about 6 to 15 microns wide, and small calcium oxalate prisms, measuring from 3 to 4 microns; the lignified and pitted parquetry cells of the inner epidermis of the pericarp; the stellate cells of the spongy mesophyll of the sepals; the small spiral and annular vessels, up to 20 microns wide; the occasional, spherical pollen grains, 30 to 36 microns in diameter.

Kousso **contains** a yellow, amorphous body, kosotoxin. It also contains the inactive, colourless, crystalline bodies, protokosin and kosidin, as well as tannin and resin. Kosin of commerce is a mixture of two inactive, yellowish, crystalline bodies, α-kosin and β-kosin, which have been isolated from kousso but are believed to be decomposition products.

Standard.—Kousso contains not more than 10 per cent. of staminate flowers and other foreign organic matter.

Kousso, in powder (Pulvis Cusso : Pulv. Cuss.), contains the constituents and possesses the diagnostic microscopical characters of Cusso, and contains not more than 200 pollen grains per milligram.

Action and Uses.—Kousso is an anthelmintic used especially for tape-worm. It is **administered** as an infusion (Infusum Cusso, 1 to 16) but is less certain in its action than extract of male fern. Treatment should be preceded by the administration of 1 drachm doses of sodium bicarbonate thrice daily, and the dose, preceded by a saline purge, taken

on an empty stomach. It is sometimes preferable to divide the dose and to give from ½ to 1 drachm every half-hour up to four doses. After some hours a further purge may be administered, although the natural action of the drug on the bowel usually renders this unnecessary. Collapse has been known to follow the use of kousso, but this is extremely rare Kosotoxin, after absorption, increases spinal reflexes and later paralyses the motor nerves.

Dose.– 8 to 16 grammes (¼ to ½ ounce), made into an infusion.

CYDONIA
(Cydon.)
Quince

Synonyms—Cydoniæ Semen; Quince Seed.

Quince consists of the seeds obtained from a small tree, *Pyrus Cydonia* Linn. (Fam. Rosaceæ), which is cultivated in temperate Europe and South Africa. The fruit resembles a pear and contains five carpellary cavities in each of which a number of seeds are closely packed in two vertical rows.

The seeds are from 6 to 7 millimetres long and dark brown in colour; the two larger sides are flattened owing to mutual pressure in the fruit, and, of the other two sides, one is arched and the other often provided with a distinct ridge; they frequently adhere to one another by a white mucilage, which appears in flakes on the surface of the seeds and in the spaces between them; the seeds are pointed at one end, where the hilum occurs as a paler spot, but they are obtuse at the other extremity, where the chalaza is situated. Transverse sections of the seed show two firm, yellowish-white cotyledons and a very narrow endosperm. The kernel has a slightly bitter taste resembling that of bitter almond.

Quince **contains** about 20 per cent. of mucilage, which is contained in the epidermis of the seed coat. The cotyledons contain fixed oil (about 15 per cent.), proteins, and probably a small proportion of amygdalin and emulsin or some allied enzyme.

Action and Uses.—Quince is soothing and demulcent and is used in the form of Decoctum Cydoniæ (1 in 80) as an ingredient of, or as a basis for, lotions and creams. Mucilage of quince (Mucilago Cydoniæ, 1 in 25) forms a useful suspending agent for such liquids as tincture of benzoin when added to toilet preparations.

DAMIANA
(Damian.)
Damiana

Synonym—Turnera.

Damiana consists of the dried leaves of *Turnera diffusa* Willd. var. *aphrodisiaca* Urb. (Fam. Turneraceæ) and probably other species of *Turnera*, herbs indigenous to Texas and Mexico.

The leaves are pale green or yellowish-green in colour, about 10 to 25 millimetres long and 5 to 10 millimetres wide, broadly lanceolate and shortly petiolate. The margin is serrate, with three to six comparatively large teeth on each side; the surface is smooth, the veins pinnate and prominent on the under surface. There are frequently present amongst the leaves small quantities of reddish-brown, cylindrical twigs, yellowish, pentamerous flowers and small, yellowish-brown, spherical fruits containing numerous minute, yellow, crescent-shaped seeds. The odour and taste are aromatic.

The diagnostic **microscopical** characters are the upper epidermis, formed of cells with almost straight walls and without stomata; the lower epidermis, with somewhat wavy walls and abundant oval stomata; the presence of an isobilateral mesophyll; the simple, filiform, unicellular trichomes, up to 900 microns long, often undulating and bent near the base, with unlignified, strongly thickened walls and a warty surface; the numerous, small clusters and occasional prisms of calcium oxalate; the thin-walled, reddish-brown cork cells from the stem; the lignified parenchyma from the pith; a few stone cells, small vessels, and occasional starch grains up to 12 microns in diameter.

Damiana **contains** from 0·5 to 1 per cent. of a greenish volatile oil, having the odour of chamomile and a light brown, amorphous, bitter principle, damianin. It also contains two resins, 3 to 4 per cent. of tannin, gum, starch and fixed oil. It yields to alcohol (60 per cent.) from 18 to 26 per cent. of extractive.

Standard.—Damiana contains not more than 15 per cent. of its stems and not more than 3 per cent. of other foreign organic matter. Acid-insoluble ash, not more than 4 per cent.

Damiana, in powder (Pulvis Damianæ : Pulv. Damian.), contains the constituents and possesses the diagnostic microscopical characters of Damiana, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Damiana is a mild purgative and has been recommended for the treatment of sexual debility. It probably acts through its mildly irritant volatile oil causing increased peristalsis and stimulation of the genito-urinary tract during excretion, but no reliable observations on its action have been recorded. It may be **administered** in the form of extract in pills or liquid extract in mixtures.

Preparations

Extractum Damianæ, B.P.C.—(Ext. Damian.)—Extract of Damiana. A soft extract. Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Extractum Damianæ Liquidum, B.P.C.—(Ext. Damian. Liq.)—Liquid Extract of Damiana. 1 in 1. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Mistura Damianæ Composita, B.P.C.—(Mist. Damian. Co.)—Compound Damiana Mixture. Each fluid drachm contains 15 minims of liquid extract of damiana, 1 minim of liquid extract of nux vomica and 2½ grains each of the hypophosphites of calcium and sodium, in chloroform water. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Pilulæ Damianæ Compositæ, B.P.C.—(Pil. Damian. Co.)—Compound Damiana Pills. Each pill contains 2 grains of extract of damiana and $\frac{1}{10}$ grain each of dry extract of nux vomica and phosphorated suet. Dose– 1 pill.

DATURÆ FOLIUM
(Datur. Fol.)
Datura Leaf

Synonym—Daturæ Folia

Datura leaf consists of the dried leaves and flowering tops of *Datura Metel* Linn (Fam. Solanaceae) an annual plant indigenous to India and also of *Datura innoxia* Miller, an annual indigenous to Mexico now growing freely in India and cultivated in England.

The leaves of *D. Metel* average about 10 centimetres long and 7 centimetres wide across the widest part; they vary considerably in outline, some being nearly cordate with few sinuses, whereas others have three or four coarse teeth on each half of the lamina; they appear nearly glabrous and are thin in texture. The leaves of *D. innoxia* are ovate or somewhat cordate and average about 12 centimetres in length and 7 centimetres in width; the margin is entire or with a few teeth, the apex acute and the surface densely pubescent. The leaves of both plants are green in colour; the flowers are white or lavender, funnel-shaped borne in the forks of the branches, about 8 centimetres long, and the ovary is ovate-conical and covered with stiff emergencies. Datura leaf has a slight but unpleasant odour.

The chief **microscopical** features are the typical solanaceous stomata on both surfaces; the trichomes, which in *D. Metel* are of two kinds, covering and glandular, the former being frequently curved and having a basal cell which rarely exceeds 30 microns in diameter or 50 microns in length, and in *D. innoxia* are of three kinds, smooth or slightly warty long-stalked glandular trichomes terminating in a single spherical secreting cell, short club-shaped glandular trichomes, and warty covering trichomes the basal cell of which is never more than 50 microns in diameter but frequently more than 50 microns in length. Cluster-crystals of calcium oxalate and large crystalline masses of unknown composition occur in the mesophyll of the leaves.

Datura leaf **contains** hyoscine, which occurs to the extent of about 0·25 to 0·55 per cent.; traces only of hyoscyamine and atropine are present.

Standard.—Datura leaf contains not more than 3 per cent. of foreign organic matter and not more than 20 per cent. of stems, fruits and flowers. Acid-insoluble ash, not more than 4 per cent.

Datura leaf, in powder (Pulvis Daturæ Folii : Pulv. Datur. Fol.), contains the constituents and possesses the diagnostic microscopical characters of Daturæ Folium, and complies with the limit for acid insoluble ash of the unground drug.

Action and Uses.—Datura leaf is used in India for the same purposes as belladonna and stramonium.

DATURÆ SEMEN
(Datur. Sem.)

Datura Seed

Datura seed consists of the dried seeds of *Datura Metel* Linn. (Fam. Solanaceæ), an annual plant indigenous to India.

The seeds are auriform in shape, flattened, from about 4 to 5 millimetres in length, 3 to 4 millimetres in width and 1 millimetre in thickness; the margin is wavy, thickened, and shows a triple ridge; the seed coat, which is yellowish-brown, thick and finely pitted, encloses a narrow, translucent endosperm and a curved embryo; the hilum is prominent owing to the presence of a strophiole which extends from the acute end of the seed to about the middle of the flattened edge. The seeds have no odour but possess a bitter taste.

The diagnostic **microscopical** characters are the large, lignified cells of the seed coat, somewhat oval in outline, mostly about 180 microns long and 90 microns wide, with very thick cell walls, the basal walls being conspicuously pitted; the drops of fixed oil, and aleurone grains.

Datura seed **contains** hyoscine, about 0·2 per cent, and a small quantity of hyoscyamine. Resin and fixed oil are also present.

Standard.—Datura seed contains not more than 2 per cent. of foreign organic matter.

Action and Uses.—Datura seed is used in India for the same purposes as stramonium seed. The tincture (Tinctura Daturæ Seminis, 1 in 4), has been used as a sedative in the treatment of asthmatic coughs in doses of 0·3 to 1 millilitre (5 to 15 minims).

DERRIS
(Derr.)

Derris

Synonyms—Tuba Root; Aker-tuba.

Derris consists of the dried rhizome and roots of *Derris elliptica* (Roxb.) Benth. and *D. malaccensis* Prain (Fam. Leguminosæ), climbing plants indigenous to Malay and the East Indies and cultivated in the Federated Malay States, Sumatra, Johore, Sarawak and Singapore.

The roots, a number of which are sometimes attached to a short piece of the rhizome, occur in pieces up to 2 metres in length, and vary in thickness from fine rootlets up to 8 millimetres in diameter; they are very flexible, hard and tough, and have a fibrous fracture. Externally, they are greyish-brown to reddish-brown, with numerous fine, longitudinal

furrows; on the thicker pieces, many elongated scars occur arranged in irregularly spaced ring formation. The transverse section exhibits a brown bark and a wood varying in colour from cream to pale brown, and in the larger pieces showing three or four concentric circles. The odour is slight, but aromatic, and the taste is at first slightly bitter, but, on chewing, a very persistent feeling of numbness develops in the tongue, and gradually extends to the throat. The smaller roots are considered to contain the greater amount of active principle, which probably reaches its maximum strength in roots which are about two years old.

Derris **contains** up to 10 per cent. of the non-volatile, colourless, crystalline substance, rotenone ($C_{23}H_{22}O_6$, melting-point, about 163°, optical rotation in benzene, about −233°), at one time known as tubatoxin. Three other crystalline substances, deguelin, tephrosin and toxicarol, have also been isolated. It yields to ether from about 7 to 25 per cent. of extractive. The active constituents are soluble in acetone, benzene, chloroform, ether and some other organic solvents, and slightly soluble in alcohol and mineral oils. Alkalis and prolonged boiling with certain solvents cause a loss of activity due to chemical change; pyridine is particularly active in this respect. Benzene and carbon tetrachloride give relatively stable solutions, but rotenone crystallises from these solutions with solvent of crystallisation. The active principles are insoluble in water, weak acids and alkalis.

Substitutes.—Other species of *Derris*, namely, *D. uliginosa* Benth., *D. involuta* Sprague, *D. chinensis* Benth and *D. koolgibberah* F M Bailey, grow wild in Australia and are said to contain rotenone. The roots, rhizome and stem of *D. uliginosa* Benth. are imported; samples consist mainly of the stem, in pieces 10 to 25 centimetres long and 8 to 25 millimetres thick. Portions are commonly found in which two stems have become intertwined. The bark is rusty greyish-brown, very rough, with prominent longitudinal ridges and furrows, numerous reddish-brown warts, and bears the remains of buds protruding at intervals. The outer layer forms grey, papery scales partially detached from the surface. The wood is very tough and hard. The transverse section exhibits a bark, light-coloured near the outside but darker near the wood; the wood is yellowish to brown, porous and without marked radial structure, and the pith is small. It contains a much smaller proportion of active principle than either *D. elliptica* or *D. malaccensis*. *Lonchocarpus Nicou* DC., cube root, and other species of *Lonchocarpus* (Fam. Leguminosæ), indigenous to parts of South America and cultivated there, contain rotenone in the stem and root.

Standard.—Derris contains not less than 2 per cent. of rotenone. Ash, not more than 6 per cent. Acid-insoluble ash, not more than 2 per cent.

Derris, in powder (Pulvis Derridis : Pulv. Derr.), contains the constituents of Derris, and complies with the standard for the unground drug.

Assay.—Extract 50 grammes, in No. 60 powder, by continuous extraction with carbon tetrachloride for at least twelve hours. Evaporate the extract to about 25 millilitres and transfer while still hot to a flat-bottomed glass dish, washing the flask with 5 millilitres of warm carbon tetrachloride and adding the washings to the dish. Cover the dish and

set aside in a cool place to allow the rotenone-carbon tetrachloride compound to crystallise, hastening the crystallisation, if necessary, by seeding with a small crystal of rotenone and cooling the solution by means of ice. Transfer the crystals to a tared Gooch crucible, wash with 20 millilitres of ice-cold carbon tetrachloride, remove the excess of solvent as far as possible by suction, and dry the crystals spontaneously or in an air oven at a temperature not exceeding 40°; each gramme of the crystals is equivalent to 0·719 gramme of rotenone.

Uses.—Derris is used extensively in horticulture and agriculture as an insecticide, and is of special value in the control of the warble fly. The powdered root is used as a dusting powder, but is more economically used mixed with an inert powder, such as kaolin or talc; alternatively it may be mixed with soft soap and water, and used in the form of a spray. One pound of the root with 4 ounces of soft soap and sufficient water to make 1 gallon is a useful insecticidal wash effective against a fairly wide range of pests. The powder produces unpleasant symptoms when inhaled, but is probably harmless to human beings and warm-blooded animals.

DEXTROSUM

(Dextros.)

Dextrose

$C_6H_{12}O_6 = 180{\cdot}1$

Synonym—Medicinal Glucose (Anhydrous).

Dextrose is a dextrorotatory monosaccharide, and may be obtained by the purification of commercial lump glucose, which is produced by the hydrolysis of starch. It occurs as a white, crystalline or granular, odourless powder with a sweet taste. When heated, it swells and burns, evolving an odour of burnt sugar. It reduces Fehling's solution on warming, and gives a silver mirror when warmed with silver ammonio-nitrate solution. The mutarotation is catalysed by the addition of traces of hydrochloric acid or alkali.

The pure monohydrate is also available for medicinal purposes; it is usually supplied under the name of medicinal glucose or dextrose monohydrate, and is the form generally employed for oral administration. Various commercial grades of glucose are obtainable containing a variable amount of water, together with maltose and dextrins; they occur in hard, lumpy masses, containing 30 to 80 per cent. of dextrose, or in the form of syrup.

Soluble in water (more than 1 in 1), alcohol (90 per cent.) (about 1 in 50), boiling alcohol (90 per cent.) (about 1 in 5) and glycerin.

Standard, B.P.—Dextrose loses, on drying at 105°, not more than 2·5 per cent. of its weight. Ash, after ignition and re-ignition with sulphuric acid, not more than 0·1 per cent. Specific rotation of a

well-boiled 10 per cent. w/v solution of the dried substance, not less than +52°. Arsenic limit, 1 part per million. Lead limit, 2 parts per million. It complies also with limit tests for acidity, less soluble sugars and dextrins, chloride, sulphate and sulphite.

Action and Uses.—Dextrose is administered either orally or parenterally in a number of conditions involving a carbohydrate deficiency, since it presents carbohydrate in a form that is readily absorbed without further digestive action. In debilitating and infectious diseases, where the food intake is insufficient, dextrose is given orally, or a 10 to 20 per cent. w/v solution is administered by intravenous or intramuscular injection or by enema. By sparing the protein from destruction and assisting in the metabolism of fats, dextrose counteracts acidosis or prevents its onset. It is, therefore, given prior to general anæsthetics and for post-operative acidosis, delayed chloroform poisoning, the vomiting of pregnancy and recurrent vomiting in children, and for sea or train sickness. In pneumonia, diphtheria and other infectious diseases, dextrose, in addition to providing nutriment, counteracts the toxæmia. It also prevents toxæmia and protects the liver from damage in poisoning due to overdosage of, or idiosyncrasy to, cinchophen, arsphenamine, phosphorus and the heavy metals. For the treatment of shock and collapse following surgical operations or accidents, the intravenous injection of dextrose solution causes an increase in the blood pressure and amplitude of the pulse. Alternatively, it may be given by subcutaneous injection or by rectal enema.

Dextrose solution is also used in osmotherapy, in which a strongly hypertonic solution (25 per cent. w/v) is injected intravenously to cause a temporary reduction in the fluid pressure in the tissues by the withdrawal of water. Such a procedure is of value in relieving intracranial pressure in hydrocephalus and meningitis, and prior to intracranial operations, also to promote drainage of the accessory nasal sinuses. Hypertonic solutions of dextrose have been used as dressings to wounds and ulcers, for the purpose of promoting by osmosis an increased flow of lymph to the tissues. Solutions of 20 to 25 per cent. w/v have been used for local application to the nasal mucous membrane in the treatment of ozœna and atrophic rhinitis. Dextrose is added to spinal anæsthetic solutions to increase the specific gravity and so localise the anæsthetic action.

Dextrose is largely used in infant feeding to augment the carbohydrate content of cows' milk. Being rapidly absorbed, it is readily assimilated and not likely to give rise to intestinal fermentation. Solutions of dextrose (50 to 60 per cent. w/v), or dextrose with sodium chloride (20 to 30 per cent. w/v), have been used by injection in the treatment of varicose veins. The advantage of such solutions is their innocuous character. They are, however, not reliable sclerosing solutions, and the clot formed is liable to recanalisation.

For intravenous injection, the concentration of the solution varies, according to the effect desired, from 5 to 25 per cent. w/v, the usual

strength being 10 per cent. A 5 per cent. w/v solution is approximately isotonic, and a 25 per cent. solution, which is strongly hypertonic, is used when an osmotic effect is desired. Solutions for intravenous injection should be freshly prepared and carefully filtered. The solution should be kept slightly above body temperature, and the injection made very slowly. A solution for **injection** is sterilised by heating in an autoclave, by tyndallisation, or by filtration. For administration as a retention enema, a 5 per cent. w/v solution is generally used.

DEXTRINUM.—Dextrin, or British gum, is an intermediate product in the ultimate hydrolysis of starch. It is made by heating starch, which has been moistened with a small quantity of dilute nitric acid and dried, at 110° to 115°. Dextrin dissolves in water, forming a mucilaginous solution which is used as an adhesive and for stiffening surgical bandages. Pure dextrin does not reduce Fehling's solution. Mixtures containing dextrin, glucose, lactose and maltose are administered as carbohydrate foods in the nutrition of infants. Mineral salts, especially iron salts, and preparations of vitamins B_1, B_2 and D, are sometimes added to the food.

Preparation

Liquor Dextrosi et Sodii Chloridi, B.P.C.—(Liq. Dextros. et Sod. Chlor.)—Dextrose and Sodium Chloride Solution. *Syn.*—Glucose-saline Solution. A sterile aqueous solution containing 5 per cent. w/v of dextrose and 0·9 per cent. w/v of sodium chloride.

DIAMORPHINÆ HYDROCHLORIDUM

(Diamorph. Hydrochlor.)

Diamorphine Hydrochloride

$C_{21}H_{23}O_5N,HCl,H_2O = 423·7$

Diamorphine hydrochloride, or diacetylmorphine hydrochloride, is the hydrochloride of the diacetyl derivative of morphine, and may be obtained by the action of acetic anhydride on morphine. It occurs as a colourless, odourless, crystalline powder with a bitter taste. On the addition of a small quantity of diamorphine hydrochloride to a few drops of nitric acid, a yellow colour is produced, which changes to greenish-blue on warming, and again becomes yellow on cooling. When a small quantity of a 5 per cent. w/v solution of diamorphine hydrochloride in alcohol is warmed with half its volume of sulphuric acid, the odour of ethyl acetate is developed. Diamorphine hydrochloride dissolves in sulphuric acid, giving a colourless solution; when a small quantity of the solution is warmed on a water-bath, cooled, and diluted with water, a deep blue colour is produced on the addition of a solution of potassium ferricyanide containing a trace of ferric chloride solution.

Diamorphine, or its salts, may be distinguished from ethylmorphine and from benzylmorphine by mixing with a few drops of a mixture of equal parts of sulphuric acid and nitric acid; a greenish-yellow colour is produced, which is not changed on warming. Diamorphine hydrochloride should be **stored** in a well-closed container away from light.

Soluble in water (1 in 2), alcohol (90 per cent.) (1 in 11); insoluble in ether; readily soluble in chloroform.

Standard, B.P.—Diamorphine hydrochloride has a melting-point of 229° to 233°. Loss on drying at 100°, not more than 4·5 per cent. Ash, not more than 0·1 per cent. It complies also with a limit test for morphine.

Action and Uses.—Diamorphine resembles morphine in its action in allaying peripheral irritation and relieving pain. It acts more strongly on the respiration than morphine, and is a more powerful drug. It is employed to relieve irritable cough, especially in phthisis, laryngitis, asthma and bronchitis with dyspnœa. Diamorphine has an advantage over morphine in that it has less tendency to cause gastric disturbance and constipation. It is easier to become addicted to the habit of taking diamorphine than morphine, and the effects of addiction are worse, greater mental and moral deterioration occurring. The drug is taken either by injection or as snuff. Diamorphine is partly oxidised in the body and partly excreted by the kidneys.

Diamorphine hydrochloride is best **administered** in the form of elixir, linctus, or pastille, or by hypodermic injection. A solution for **injection** may be sterilised by tyndallisation or by filtration, and the containers must comply with the tests for limit of alkalinity of glass. The hydrochloride should be given in neutral solution; it is **incompatible** with acids and alkalis, by which it is readily decomposed. In cases of **poisoning** by diamorphine and its salts, the antidotes for morphine should be administered.

Dose.– 0·0025 to 0·008 gramme ($\frac{1}{24}$ to $\frac{1}{8}$ grain).

Preparations

Elixir Diamorphinæ et Pini Compositum, B.P.C.—(Elix. Diamorph. et Pini Co.)—Compound Elixir of Diamorphine and Pine. Each fluid drachm contains approximately $\frac{1}{60}$ grain of diamorphine hydrochloride and $\frac{5}{12}$ grain of terpin hydrate, with oil of pumilio pine, alcohol (90 per cent.), glycerin and sucrose, coloured with compound solution of tartrazine. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Elixir Diamorphinæ et Terpini, B.P.C.—(Elix. Diamorph. et Terpin.)—Elixir of Diamorphine and Terpin. Each fluid drachm contains approximately $\frac{1}{15}$ grain of diamorphine hydrochloride and $\frac{5}{9}$ grain of terpin hydrate, with alcohol (90 per cent.), glycerin and syrup of wild cherry. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Elixir Diamorphinæ et Terpini cum Apomorphina, B.P.C.—(Elix. Diamorph. et Terpin. c. Apomorph.)—Elixir of Diamorphine and Terpin with Apomorphine. Each fluid drachm contains $\frac{1}{120}$ grain of diamorphine hydrochloride and $\frac{5}{9}$ grain of terpin hydrate, with apomorphine hydrochloride, alcohol (90 per cent.), glycerin and syrup of wild cherry. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Glycerinum Diamorphinæ, B.P.C.—(Glyc. Diamorph.)—Glycerin of Diamorphine. Each fluid drachm contains about $\frac{1}{30}$ grain of diamorphine hydrochloride, with chloroform, alcohol (90 per cent.), concentrated acid infusion of roses, syrup, distilled water and glycerin. Dose.– 2 to 8 millilitres ($\frac{1}{2}$ to 2 fluid drachms).

Linctus Diamorphinæ, B.P.C.—(Linct. Diamorph.)—Linctus of Diamorphine. Each fluid drachm contains about $\frac{1}{1}$ grain of diamorphine hydrochloride with tincture of hyoscyamus, spirit of chloroform, syrup of wild cherry, syrup of tolu and glycerin. Dose.– 2 to 8 millilitres ($\frac{1}{2}$ to 2 fluid drachms).

Linctus Diamorphinæ Camphoratus, B.P.C.—(Linct. Diamorph. Camph.)—Camphorated Linctus of Diamorphine. Each fluid drachm contains $\frac{1}{10}$ grain of diamorphine hydrochloride and $\frac{3}{4}$ minim of liquid extract of ipecacuanha, with camphor, benzoic acid, oil of anise, tincture of squill and syrup. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Linctus Diamorphinæ cum Ipecacuanha, B.P.C.—(Linct. Diamorph. c. Ipecac.)—Linctus of Diamorphine with Ipecacuanha. Each fluid drachm contains $\frac{1}{20}$ grain of diamorphine hydrochloride and $\frac{3}{4}$ minim of liquid extract of ipecacuanha, with tincture of hyoscyamus, spirit of chloroform, syrup of tolu, syrup of wild cherry and glycerin. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Linctus Diamorphinæ et Scillæ, B.P.C.—(Linct. Diamorph. et Scill.)—Linctus of Diamorphine and Squill. Each fluid drachm contains $\frac{1}{10}$ grain of diamorphine hydrochloride and $\frac{1}{30}$ grain of sodium antimonyltartrate, with liquid extracts of senega and squill, glycerin and syrup. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Linctus Diamorphinæ et Thymi, B.P.C.—(Linct. Diamorph. et Thym.)—Linctus of Diamorphine and Thyme. Each fluid drachm contains $\frac{1}{40}$ grain of diamorphine hydrochloride, and $\frac{1}{32}$ grain of apomorphine hydrochloride, with liquid extract of thyme, solution of tolu and glycerin. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Pastilli Diamorphinæ et Pini Compositus, B.P.C.—(Pastill. Diamorph. et Pini Co.)—Compound Diamorphine and Pine Pastilles. Each pastille contains $\frac{1}{15}$ grain of diamorphine hydrochloride, $\frac{1}{4}$ minim of oil of pumilio pine and $\frac{1}{8}$ grain of terpin hydrate.

DIASTASUM

(Diastas.)

Diastase

Synonym—Amylase.

Diastase is an impure enzyme obtained by precipitation with alcohol from an infusion of malt prepared at a temperature not exceeding 60°. The diastase may be purified by re-precipitation. It occurs as a whitish or yellowish, amorphous powder. It is not precipitated by calcium hydroxide, lead acetate, or barium hydroxide solutions. It has the power of converting starch into maltose and dextrose, the optimum temperature being about 55°.

The methods of assay may be summarised under two heads:—1.—The determination by means of Fehling's solution of the reducing sugars produced by the action of the enzyme on a known quantity of starch. 2.—The time taken for the complete conversion of a known quantity of starch, the end of the reaction being indicated by the solution ceasing to give a reddish colour with iodine. The strength is expressed by the number of parts of starch converted by one part of diastase, but unless details of the method of assay are given, statements regarding the strengths of commercial samples are of little value. The

activity of the enzyme is destroyed at high temperatures and also in the presence of acid or alkali.

Almost entirely **soluble** in water; insoluble in alcohol.

Action and Uses.—Diastase acts as a sugar-forming ferment and is useful in certain gastric disorders. It may be mixed with starchy foods to assist their conversion into soluble sugar, or it may be taken during a meal, mixed with a little milk or in a cachet. It is employed in amylaceous dyspepsia, sometimes with pepsin and capsicum. The optimum *p*H for the action of diastase is 5·2. Its action is decreased in more acid or more alkaline media and at *p*H 1·7 it is irreversibly inactivated. The presence of proteins, which act as buffers, prevents the hydrochloric acid secreted during the early stages of digestion from reaching too low a *p*H. This, combined with the fact that there is relatively no movement in the cardiac end of the stomach, allows diastasic digestion to proceed for about thirty minutes after ingestion of food.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

Preparation

Pulvis Pepsini Compositus, B.P.C.—(Pulv. Pepsin. Co.)—Compound Pepsin Powder. Pepsin, about 1 in 6, pancreatin, 1 in 10, and diastase, 1 in 100, with lactic acid, hydrochloric acid and lactose. Dose.– 0·6 to 2 grammes (10 to 30 grains).

DIATOMITE
(Diatomit.)

Diatomite

Synonyms—Purified Siliceous Earth; Purified Kieselguhr.

Diatomite is obtained from siliceous deposits consisting chiefly of minute, structural forms of the skeletal remains, or frustules, of diatoms —minute, unicellular organisms belonging to the Diatomaceæ. Immense beds from 40 to 50 feet deep occur in Aberdeenshire, also in Germany, Virginia and elsewhere. Specimens from different localities vary considerably, not only in appearance, but in the species of diatoms present and in the matter with which the diatomaceous residue is associated. The crude material is air-dried and crushed, incinerated to destroy organic matter, boiled with dilute hydrochloric acid, washed with water and dried. It consists chiefly of silica and occurs as a bulky, fine, odourless powder, white to pale buff in colour. **Microscopically**, it is seen to consist of various forms of diatomaceous skeletons. There is no quantitative method capable of discriminating between this type of silica and inorganic crystalline silica in the form of quartz, sand, silt, etc., but an authentic sample should possess the following characteristics. Mounted in olive oil and viewed under the low power of a microscope, the diatoms become almost invisible whilst inorganic silica becomes pronounced; the latter should not be present to any appreciable

extent. By careful elutriation the diatoms may be washed away, leaving only a small residue of grit. The apparent density, as determined on the substance in No. 30 powder, dried at 105°, in a glass cylinder of about 2 centimetres diameter and 6 centimetres depth, should be higher than 0·4. It absorbs about 4 times its own weight of water without becoming fluid. In its natural state, the deposit contains varying proportions of organic matter (0·5 to 20 per cent.), as well as sand, clay and iron oxide. It should be **stored** in well-closed containers.

Soluble in alkalis, insoluble in acids except hydrofluoric acid.

Standard.—Diatomite loses on ignition not more than 10 per cent. of its weight (limit of moisture), and is not darkened in colour (limit of organic impurities). Shake 2 grammes with 40 millilitres of dilute hydrochloric acid for fifteen minutes and filter; 20 millilitres of the filtrate, evaporated to dryness and ignited, leaves not more than 0·01 gramme of residue. Boil 2 grammes with 20 millilitres of water for ten minutes, filter and dilute to 100 millilitres; the solution is neutral to litmus, and 50 millilitres complies with the limit test for iron. 2 grammes produces no effervescence on the addition of 50 millilitres of dilute hydrochloric acid (limit of carbonate), and on boiling, filtering and diluting to 100 millilitres, 50 millilitres of the solution complies with the limit test for sulphates.

Uses.—Diatomite is used in the preparation of dusting powders, usually with boric acid and zinc oxide or stearate. It is also employed as a basis for disinfectant powders and for dentifrices—powder or paste—containing phenol or boric acid. It may be used as a pill excipient for volatile oils and mixtures which liquefy (such as menthol and phenol), the mass being prepared with hydrous wool fat or glycerin of tragacanth. Diatomite is also used as a filtering medium for clarifying syrups, waters and other liquids; for this purpose the powder should be triturated with a little of the liquid before being added to the bulk of liquid to be filtered.

DICHLORAMINA

(Dichloram.)

Dichloramine

$C_7H_7O_2NCl_2S = 240·0$

Synonym—Dichloramine-T.

Dichloramine is *p*-toluenesulphondichloroamide, $CH_3·C_6H_4·SO_2·NCl_2$, and may be obtained by the action of hypochlorites upon *p*-toluenesulphonamide. It occurs as pale yellow crystals, or as a yellowish, crystalline powder, having an odour resembling that of chlorine. It gradually decomposes on exposure to air, with loss of chlorine; it is also decomposed by alcohol. Melting-point, about 78°; at higher temperatures, sudden decomposition takes place. It liberates

bromine from neutral sodium bromide solution (distinction from chloramine), and liberates chlorine when mixed with sulphuric acid. It should be **stored** in well-closed glass containers in a cool place, and protected from light.

Soluble in chloroform (about 1 in 1), benzene (about 1 in 1), carbon tetrachloride (about 1 in 3), glacial acetic acid, chlorinated eucalyptol and chlorinated paraffin; almost insoluble in water.

Standard.—Dichloramine contains not less than 93 per cent. of $C_7H_7O_2NCl_2S$. To 1 gramme add 5 millilitres of alcohol (90 per cent.), warm until interaction ceases, evaporate the resulting solution to dryness, and ignite; the residue weighs not more than 0·001 gramme (limit of inorganic matter). 1·0 gramme dissolved in 5 millilitres of chloroform forms a clear solution. 0·1 gramme added to 1 millilitre of sulphuric acid evolves chlorine, but does not colour the acid more than faintly yellow (limit of readily carbonisable substances).

Assay.—Weigh accurately about 0·2 gramme, and dissolve in 40 millilitres of glacial acetic acid in a dry, glass-stoppered bottle. Add 3·5 grammes of potassium iodide dissolved in 120 millilitres of water, allow to stand for ten minutes, and titrate the liberated iodine with N/10 sodium thiosulphate; each millilitre of N/10 sodium thiosulphate is equivalent to 0·006001 gramme of $C_7H_7O_2NCl_2S$.

Action and Uses.—Dichloramine is a powerful antiseptic, and is used in oily solution. A 2 per cent. solution in a mixture of 1 part of chlorinated eucalyptol, or chlorinated oil of eucalyptus, and 4 parts of chlorinated paraffin has been used for disinfecting the naso-pharynx of meningococcus carriers, and in the treatment of gonorrhœa.

DICHLORETHYLENUM

(Dichlorethylen.)

Dichlorethylene

$C_2H_2Cl_2 = 96·93$

Dichlorethylene, or acetylene dichloride, ClHC : CHCl, may be made by controlled interaction of acetylene and chlorine, or by the action of iron on a mixture of tetrachlorethane and water. Dichlorethylene is a mixture of two stereoisomerides, boiling respectively at 48° and 60°. It is a heavy, mobile liquid, with an ethereal but slightly acrid odour. Specific gravity, about 1·30. It decomposes in the presence of air, light and moisture, forming hydrochloric acid and chlorine, which it is liable to contain. It may be purified by shaking with ammoniacal silver nitrate solution and separating, drying over quicklime, and distilling. Pure dichlorethylene has practically no action on metals with the exception of silver. Dichlorethylene dissolves rubber, fats, phenol, camphor, iodoform, and formaldehyde, and to a slight extent, alcohol and ether. It also dissolves bromine, forming a

reddish-brown solution, and iodine, forming a reddish-violet solution; the bromine solution is slowly decolourised, the halogen forming an additive compound. Dichlorethylene decolourises potassium permanganate solution. It should be **stored** in small, completely-filled bottles in a dark place.

Insoluble in water.

Uses.—Dichlorethylene has been employed as a solvent of iodine for skin sterilisation previous to operations. For this purpose, a 2·5 per cent. solution is recommended, which is approximately saturated. It may cause skin irritation.

DIGITALINUM
(Digitalin.)
Digitalin

Synonym—Digitalinum Purum Germanicum.

Digitalin is a standardised mixture of glycosides from the seeds of *Digitalis purpurea* Linn. (Fam. Scrophulariaceæ). It contains digitalinum verum, $C_{36}H_{56}O_{14}$, a definite, physiologically-active glycoside, together with a large proportion of water-soluble glycosides, concerning the nature of which little is known, and two physiologically-inactive glycosides, digitonin, $C_{55}H_{90}O_{29}$, and gitonin, $C_{49}H_{80}O_{28}$. Digitalis seed does not contain digitoxin or gitoxin. Digitalin may be prepared from the seed by extraction with alcohol and purifying the product obtained on evaporation by treatment with lead acetate and subsequent precipitation with tannic acid. After removal of the tannic acid, the crude digitalin is washed with ether and dried at a low temperature. The product, which may show considerable variation in activity, is assayed by the biological assay of powdered digitalis and its potency compared with the international standard digitalis, of which 0·1 gramme is taken to have an amount of activity described as 1 unit. It is then adjusted to contain 80 units per gramme by mixing with a suitable diluent such as lactose. Digitalin is a yellowish-white powder, which is free from odour but has an intensely bitter taste. The aqueous solution is neutral, and froths when shaken. When a solution of 0·001 gramme of digitalin in 1 millilitre of glacial acetic acid containing a trace of ferric chloride is superimposed upon 1 millilitre of sulphuric acid, a reddish band is produced.

Very **soluble** in water and alcohol; very sparingly soluble in chloroform and ether.

Standard.—Digitalin, when tested by the method of the British Pharmacopœia for the biological assay of Digitalis Pulverata, possesses 80 units of activity (equivalent to the activity of 8 grammes of the international standard digitalis powder) in 1 gramme.

Action and Uses.—Digitalin is much less active than digitoxin, but is not cumulative. On account of its ready solubility in water, it is employed in the preparation of solutions for injection and tablets. Solutions of digitalin for **injection** may be sterilised by tyndallisation or by filtration, and should be stored protected from light. This standardised digitalin should be dispensed when digitalin is prescribed without qualification, and it should be carefully distinguished from digitoxin (digitaline crystallisée). In cases of **poisoning** by digitalin, the antidotes described under Digitalis Folium should be employed.

Dose.–For a single administration, 0·03 to 0·06 gramme ($\frac{1}{2}$ to 1 grain); for repeated administration, 0·004 to 0·012 gramme ($\frac{1}{15}$ to $\frac{1}{5}$ grain), by subcutaneous injection.

Preparation

Injectio Digitalini, B.P.C.—(Inj. Digitalin.)—Injection of Digitalin. Each millilitre (15 minims) contains 0·03 gramme of digitalin, which is equivalent to about 2½ units of activity. Dose.– For a single administration, 1 to 2 millilitres (15 to 30 minims), by subcutaneous injection; for repeated administration, 0·2 to 0·4 millilitre (3 to 6 minims), by subcutaneous injection.

DIGITALIS FOLIUM

(Digit. Fol.)

Digitalis Leaf

Synonyms—Digitalis; Foxglove Leaf.

Digitalis leaf consists of the dried leaves obtained from the foxglove, *Digitalis purpurea* Linn. (Fam. Scrophulariaceæ), a biennial herb widely distributed throughout Europe and common in England. The leaves are rapidly dried at 55° to 60° as soon as possible after collection. Digitalis leaf should be **stored** in well-closed containers and protected from moisture.

The dried leaves are brittle, greyish-green in colour, about 10 to 30 centimetres long and 4 to 10 centimetres wide, ovate-lanceolate to broadly-ovate and petiolate. The lamina has an irregularly crenate or serrate margin, a decurrent base, and subacute apex. The upper surface is hairy, the lower surface usually densely pubescent and marked by a reticulation of raised veinlets. The leaves have a distinctly bitter taste.

The diagnostic **microscopical** characters are the hairs, of two kinds, simple hairs usually 3 to 5 cells long, bluntly pointed and finely warty, and glandular hairs, consisting usually of a unicellular or, more rarely, uniseriate pedicel bearing a unicellular or bicellular glandular head; the stomata, which are more numerous on the lower than the upper surface, having no special subsidiary cells; the wavy-walled epidermal cells of the lower surface; the large water-pores, one or occasionally two being situated at the apex of most of the teeth; the absence of calcium oxalate crystals and of sclerenchymatous elements.

Digitalis **contains** several glycosides, to which its physiological activity is due; of these, digitoxin, $C_{41}H_{64}O_{13}$, and gitoxin, $C_{41}H_{64}O_{14}$, have been obtained crystalline. A third glycoside, $C_{47}H_{74}O_{18}$, is described as having the composition of digitoxin with the addition of one molecule of dextrose; it is hydrolysed by the enzymes of the leaf into digitoxin and dextrose. The remaining glycosides have not been obtained in a state approaching purity; they are amorphous and more soluble than the crystalline glycosides. The latter are very sparingly soluble in water, but become more soluble in the presence of the amorphous glycosides. Distinctive names have been given to various mixtures, but only the two above-mentioned glycosides are definite substances. Gitalin and digitalein are mixtures of indefinite composition. Anhydrogitalin is a crude form of gitoxin. Digitalis seeds do not contain digitoxin or gitoxin, but contain a closely related glycoside, digitalinum verum, $C_{36}H_{56}O_{14}$, associated with a large proportion of water-soluble glycosides and two physiologically-inactive glycosides, digitonin, $C_{55}H_{90}O_{29}$, and gitonin, $C_{49}H_{80}O_{28}$. Digitalinum verum is not crystalline, but it forms crystalline derivatives. A standardised mixture of glycosides prepared from the seeds is known as digitalin, or digitalinum purum germanicum (see Digitalinum).

Substitutes.—Digitalis leaf, especially in the crushed or powdered state, is occasionally adulterated, leaves of the following plants having been substituted for the true drug:—Mullein leaves, the leaves of *Verbascum Thapsus* Linn., are woolly and bear branching candelabra hairs; comfrey leaves, from *Symphytum officinale* Linn., are lanceolate or ovate in shape and bear isolated stiff hairs; primrose leaves, from *Primula vulgaris* Huds., are nearly spathulate; they have straight, lateral veins, dividing near the margin. The leaves of the ploughman's spikenard, from *Inula Conyza* DC, have entire or dentate margins with horny points to the teeth. In elecampane leaves the lower lateral veins are not decurrent. Spanish foxglove leaves, from *Digitalis Thapsi* Linn., are distinguished by their greyish-green or yellowish-green colour, by the presence on both surfaces of numerous glandular trichomes with unicellular heads and 3- to 4-celled stalks, by the presence of pericyclic fibres and a few small prisms of calcium oxalate and by the absence of non-glandular trichomes. They are said to be more active than the leaves of *D. purpurea*. The leaves of *D. lutea* Linn., a native of Southern and Western Europe and cultivated in America, are sessile, about 10 to 28 centimetres long and 3 to 6 centimetres wide, oblanceolate, with an irregularly dentate or seriate margin, which is fringed with long, non-glandular trichomes in the basal half of the leaf, which is otherwise glabrous.

Standard, B.P.—Digitalis leaf contains not more than 2 per cent. of foreign organic matter. Loss on drying at 100°, not more than 8 per cent. Acid-insoluble ash, not more than 5 per cent.

Digitalis leaf in powder, contains the constituents and possesses the diagnostic microscopical characters of Digitalis Folium, and complies with the limits for moisture and ash of the unground drug. When powdered digitalis leaf is prescribed, the standardised powder Digitalis Pulverata, must be used.

Action and Uses.—Digitalis increases the activity of all forms of muscle tissue, but more especially that of the heart and arterioles. It exerts a double action on the heart; the diastole is prolonged, giving, in moderate doses, more time for complete filling and the efficiency of systole is much increased, so that, in spite of the

slowing, the output of blood per minute is augmented. The arterial system is filled, and the venous pressure falls as the blood finds an easy outlet into the empty heart. This redistribution of blood in the patient suffering from cardiac failure is shown by the shrinking of the swollen liver, the absorption of œdema with diuresis and the relief of pulmonary stasis and dyspnœa. Digitalis exerts its most pronounced effect on the heart in mitral disease with dilatation and passive venous congestion. Here, the action of the heart is almost always very rapid, and digitalis acts by prolonging diastole and so resting the muscle; it also improves systole and forces more blood through the coronaries, thus improving the nutrition of the heart; perhaps for this reason an irregular heart becomes regular. Digitalis benefits most patients in whom the auricles are fibrillating; here also, it acts by improving the nutrition of the heart and by causing a partial heart-block.

Perhaps the greatest use of digitalis is in auricular fibrillation. In this condition, a large number of feeble auricular beats are imperfectly transmitted to the ventricles, and it is suggested that digitalis, by depressing conductile tissue, allows only a few of these impulses to get through. By its action, the ventricular beats are diminished in number and strengthened in character, so that the heart performs its work with greater efficiency and clears up the results of impaired circulation, namely, dropsy. The diuretic action that takes place is not due to direct action on the kidney but on the circulation, thus improving the blood supply to the kidney. In auricular fibrillation, the slowing of the heart has been definitely proved to be due to the digitalis. In the condition of auricular flutter, treatment by digitalis converts it into fibrillation, and by withdrawal of the drug the normal rhythm of the heart is restored. In specific fevers and other conditions in which cardiac failure may ensue, it should be given early, so that the drug may be acting when the danger threatens. In ordinary conditions, it takes about twenty-four hours before its effect on heart muscle is appreciated. In urgent cases, strophanthus is often preferred because it acts very much more quickly, but digitalis often acts in six hours, or less, if 8 millilitres (2 fluid drachms) of tincture of digitalis is given to the patient, followed by 4 millilitres (1 fluid drachm) every four hours until the desired effect is obtained. Careful observation is, of course, required and the dose reduced after the therapeutic effect has been obtained, otherwise toxic symptoms may occur. Although digitalis constricts blood vessels slightly, it does not raise the blood pressure in these cardiac patients, and on broad principles such an increase of pressure is undesirable as entailing more work for the heart.

Digitalis is cumulative, and this is especially the case with digitoxin. The other digitalis glycosides are excreted more rapidly, excretion being complete in about a week. In the case of galenical preparations, it is found that about 25 per cent. is still present in the body after ten days. The active principles of digitalis are irritating to the gastric mucous

membrane and may cause nausea and vomiting. Evidence of accumulation is shown by headache, giddiness, sickness, and a marked slowing of the pulse.

Digitalis leaf is **administered** as Digitalis Pulverata in tablets or as Pilulæ Digitalis Compositæ, and also as Tinctura Digitalis or Infusum Digitalis Recens. The use of a concentrated infusion is not sanctioned. When digitalis by mouth is not tolerated, the tincture may be given as a rectal enema in doses up to 4 millilitres diluted to 100 millilitres with physiological sodium chloride solution. When Digitalis Folium, Digitalis, Digitalis Folia or Pulvis Digitalis is prescribed, Digitalis Pulverata must be dispensed. In cases of **poisoning** by digitalis, where there is a very slow and irregular pulse, the administration of atropine is generally all that is necessary. In the more severe cases, with very rapid heart-beat, the stomach pump must be used if the digitalis has been taken by the mouth, and drugs may be employed which depress and diminish the irritability of the heart, such as chloral and chloroform; amyl nitrite may also be found useful.

DIGITALIS LANATA.—Digitalis lanata consists of the leaves of *Digitalis lanata* Ehrhardt, a native to the neighbourhood of the Danube. The leaves are oblong-lanceolate, with an entire margin, which is ciliate in the basal half of the leaf; otherwise the leaf is glabrous. Digitalis lanata contains digitoxin, gitoxin and digoxin, $C_{41}H_{64}O_{14}$, a highly active, crystalline glycoside which has not been isolated from other species. Each of these glycosides also exists in the leaf in combination with dextrose and an acetyl group. These complex glycosides are described as digilanid A, B and C, respectively, and by enzymatic hydrolysis they can be converted into the simpler glycosides. Digilanid C is apparently identical with the glycoside, lanadigin, also obtained from *D. lanata*. In addition to the crystalline glycosides, the leaf contains amorphous glycosides. The leaf of *D. lanata* is usually three or four times more potent than the leaf of *D. purpurea*.

Preparations

Digitalis Pulverata, B.P.—(Digit. Pulverat.)—Powdered Digitalis. Digitalis leaf in No. 20 powder of ascertained strength, which is stated in units, one unit corresponding to the activity of 0·1 gramme of the international standard digitalis powder. Loss on drying at 100°, not more than 8 per cent. For therapeutic administration, the strength is adjusted to 10 units per gramme by admixture with exhausted digitalis leaf or with a weaker powdered digitalis. It should be stored in air-tight containers. Dose.– For a single administration, 0·2 to 0·6 gramme (3 to 10 grains), equivalent to 2 to 6 units of activity; for repeated administration, 0·03 to 0·1 gramme (½ to 1½ grains), equivalent to 0·3 to 1 unit of activity.

Infusum Digitalis Recens, B.P.—(Inf. Digit. Rec.)—Fresh Infusion of Digitalis. *Syn.*—Infusum Digitalis; Infusion of Digitalis. It is prepared with the equivalent of 0·5 per cent. w/w of international standard digitalis powder. 120 millilitres or 4 fluid ounces contains 6 units of activity; it is one-twentieth the strength of tincture of digitalis. When Infusum Digitalis or infusion of digitalis is prescribed, fresh infusion of digitalis shall be dispensed. Dose.– 6 to 20 millilitres (1½ to 5 fluid drachms); single dose.–30 to 120 millilitres (1 to 4 fluid ounces).

Pilulæ Digitalis Compositæ, B.P.C.—(Pil. Digit. Co.)—Compound Digitalis Pills. *Syn.*—Pilulæ Digitalis cum Scilla; Guy's Pills; Niemeyer's Pills. Each pill contains 1 grain each of powdered digitalis, squill, and pill of mercury. **Dose.– 1 or 2 pills.**

Tinctura Digitalis, B.P.—(Tinct. Digit.)—Tincture of Digitalis. Each millilitre possesses one unit of activity and is equivalent to 0·1 gramme of the international standard digitalis powder. It may be prepared from digitalis leaf by percolation with alcohol (70 per cent.), the product being adjusted to the required strength, or it may be prepared from powdered digitalis by percolation without subsequent adjustment. 6 millilitres or 1½ fluid drachms contains 6 units of activity. Dose.—0·3 to 1 millilitre (5 to 15 minims); single dose, 2 to 6 millilitres (½ to 1½ fluid drachms).

Tinctura Digitalis I.A. is prepared with alcohol (70 per cent.) from 10 per cent. w/w of digitalis leaf. Sirupus Digitalis I.A. contains 5 per cent. of Tinctura Digitalis I.A.

DIGITOXINUM
(Digitox.)

Digitoxin

Synonym—Digitaline Crystallisée.

Digitoxin of commerce is obtained from digitalis leaf and consists mainly of a definite, crystalline glycoside, digitoxin, $C_{41}H_{64}O_{13}$, associated with other more soluble glycosides and usually a small proportion of a sparingly soluble glycoside, gitoxin, $C_{41}H_{64}O_{14}$. It occurs as a white, microcrystalline powder, or in colourless, rectangular plates. It has an intensely bitter taste. When a solution of 0·001 gramme of digitoxin in 1 millilitre of acetic acid containing a trace of ferric chloride is superimposed upon 1 millilitre of sulphuric acid, a brown band is formed; the upper part of the sulphuric acid layer becomes brown with a tinge of red, while the lower part of the acetic acid layer changes to an indigo-blue colour which is stable for some hours.

Almost **insoluble** in water; sparingly soluble in ether; readily soluble in alcohol and chloroform.

Standard.—Digitoxin does not melt below 240°. Loss on drying at 100°, not more than 1 per cent.

Action and Uses.—Digitoxin is the most powerful of the glycosides which have been extracted from digitalis leaf, but owing to slow excretion it is cumulative in its action; five days after an injection, 50 per cent. of the amount injected is still present and some remains after twenty days. Other objections to digitoxin are its excessive irritant properties and vasoconstrictor action. It may be **administered** as pills or granules, or hypodermically in solution (1 in 1000), using as a solvent a mixture of alcohol (90 per cent.), 6 parts, glycerin, 3 parts, and water, 1 part. It may be given rectally in doses of 0·0005 to 0·0003 gramme ($\frac{1}{120}$ to $\frac{1}{80}$ grain). Solutions for **injection** may be prepared by aseptic methods in an oily medium, the oil having previously been heated at 150° for one hour; or in a sterilised mixture of alcohol, glycerin and water. The solution should be protected from light. In cases of

poisoning by digitoxin, the antidotes described under Digitalis Folium should be employed

Dose.– 0·0001 to 0·001 gramme ($\frac{1}{6\,0\,0}$ to $\frac{1}{6\,0}$ grain).

DIGOXINUM.—Digoxin $C_{41}H_{64}O_{14}$, is a definite, crystalline glycoside, isolated from the leaves of *Digitalis lanata*. It melts and decomposes at about 265°. When dissolved in glacial acetic acid containing a trace of ferric chloride and treated with sulphuric acid, it forms a brown ring, and the supernatant acetic acid gradually assumes an indigo-blue colour. The specific rotation of a 1 per cent. solution in pyridine is + 13·3° for the mercury green line. When tested on frogs, 1 milligram of digoxin is equal to 0·28 milligram of ouabain. It is almost insoluble in water, sparingly soluble in chloroform, ethyl acetate and acetone, and more soluble in dilute alcohol. It is used in the treatment of auricular fibrillation, when rapid effects are desired, and is usually given by the mouth, but may be given intravenously. Dose.– For repeated administration, 0·0003 gramme ($\frac{1}{2\,0}$ grain); for a single administration 0·0012 to 0·0015 gramme ($\frac{1}{5\,0}$ to $\frac{1}{4\,0}$ grain).

GITOXINUM.—Gitoxin, $C_{41}H_{64}O_{14}$, is a definite, crystalline glycoside, isolated from the leaves of *Digitalis purpurea* or *D. lanata*. It melts and decomposes at 285°. When dissolved in glacial acetic acid containing a trace of ferric chloride and treated with sulphuric acid, it forms a brown ring; the upper part of the sulphuric acid layer becomes red and the acetic acid layer gradually assumes an indigo-blue colour. The specific rotation of a 1 per cent. solution in pyridine is + 3·5° for the mercury green line. It is almost insoluble in water, sparingly soluble in chloroform, ethyl acetate and acetone, and more soluble in dilute alcohol.

DULCAMARA

(Dulcamar.)

Bittersweet

Synonyms—Woody Nightshade; Dulcamaræ Caulis.

Bittersweet consists of the dried stems and branches of *Solanum Dulcamara* Linn. (Fam. Solanaceæ), a climbing, perennial shrub common in England and growing freely in Europe, Northern Asia, North Africa and North America. The stems are collected in the autumn, after the fall of the leaf, when the plant is two or three years old, dried and cut into pieces about 5 millimetres to 2 centimetres in length.

The stem is sub-cylindrical and about 6 millimetres in diameter. The outer surface is greenish-brown in colour and glabrous; it is marked with alternate leaf-scars and shows longitudinal furrows and wrinkles. The outer layer can be easily removed, disclosing a greenish cortex. The wood is yellowish in colour and shows from one to three concentric rings; the white pith has a central hollow. The taste is at first bitter and then sweet. The odour of the drug is unpleasant when fresh, but slight when dry.

Bittersweet **contains** two acid saponins, dulcamaretic acid which is non-glycosidal, and dulcamaric acid which is glycosidal. The drug also contains about 1 per cent. of a glycosidal alkaloid, solaceine.

Action and Uses.—Dulcamara is now rarely used in medicine, but has been administered as an infusion (Infusum Dulcamaræ, 1 in 10; dose, 1 to 2 fluid ounces).

DUODENI MEMBRANUM
(Duoden. Memb.)

Duodenal Membrane

Synonyms—Pulvis Duodenalis; Duodenal Powder.

Duodenal membrane is prepared by cleansing the upper portion of the fresh duodenum of the pig, *Sus scrofa* Linn., removing the duodenal membrane by scraping, scaling the membrane on glass plates at 70° to 80°, powdering the scales when dry, mixing the powder with one-fourth its weight of calcium phosphate, and passing the mixture through a No. 60 sieve. It occurs as a light, greyish-brown, hygroscopic powder, with a slight odour suggesting that of cooked meat, and a slightly saline taste. This preparation must be kept in well-corked or stoppered bottles, and it will then retain its properties for some time. Duodenal membrane contains secretin, enterokinase, erepsin, invertase, lactase and maltase.

Action and Uses.—The therapeutic action of duodenal membrane may be due to the large quantities of enterokinase contained in it, which converts the inactive trypsinogen of pancreatic juice into highly active trypsin. The other enzymes contained in the powder, erepsin, invertase, lactase and maltase, may assist the digestion of proteoses, sucrose, lactose and maltose contained in the food. It is useless as a pancreatic stimulant, since secretin is not absorbed from the lumen of the alimentary canal and is rapidly destroyed by both pepsin and trypsin.

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

LIQUOR DUODENALIS.—Duodenal solution is a solution of the constituents of the duodenal membrane freed from proteins and containing the equivalent of 10 per cent. of the original mucous membrane. It remains active for twenty-four hours, after which time it quickly loses its activity. The deterioration may be retarded, however, for some weeks if the solution is kept slightly acid and sterile and stored in the dark. It is active when injected hypodermically, but useless when given by the mouth.

SECRETINUM.—Secretin is the specific hormone for the external secretion of the pancreas. It is found in the active form in the mucous membrane of the duodenum and jejunum of all vertebrates, and may be extracted from mucous membrane of pigs' duodena by alcohol, 5 per cent. sodium chloride, or 0·4 per cent. hydrochloric acid. It is soluble in water and alcohol. The solution in water gives some of the protein colour reactions, and the active principle is quickly destroyed by pepsin and trypsin. Secretin, when absorbed into the blood, stimulates the pancreas to secrete large quantities of pancreatic juice and also increases the bile flow to a small extent. In the live animal, the passage of secretin into the blood ensues upon the entrance of bile into the duodenum. Presumably, the bile salts, in their passage through the cells of the intestinal mucosa, carry the secretin contained in them into the blood and thereby to the pancreas. There is no evidence that secretin stimulates the pancreas to produce its internal secretion (insulin). When administered hypodermically, it produces a slow and moderate secretion of pancreatic juice. It is most effective when administered intravenously but is useless when taken by the mouth, since it is rapidly destroyed by both pepsin and trypsin. It may be administered as Liquor Duodenalis.

ELATERIUM
(Elaterium)
Elaterium

Elaterium consists of the dried sediment which deposits in the juice of the almost ripe fruits of *Ecballium Elaterium* A. Rich. (Fam. Cucurbitaceæ), a plant common in Southern Europe, particularly in Malta and in the countries bordering on the Mediterranean. It is cultivated in England.

The drug occurs in thin, opaque, flat or slightly curved, rectangular pieces about 2 to 2·5 centimetres in either direction, and 2 to 5 millimetres thick, pale green in colour when fresh, becoming greyish on keeping. The fracture is short and granular, exhibiting minute crystals. The odour is slight, and the taste bitter and acrid.

Elaterium **contains** from 14 to 30 per cent. of elaterin in the Maltese drug, and from 20 to 27 per cent. in the English drug, about 5 to 12 per cent. of water, about 8 per cent. of inorganic matter, a small quantity of starch, fatty acids, a phytosterol and sugar.

Standard.—Elaterium contains not less than 20 per cent. of elaterin.

Assay.—Macerate about 1 gramme, in powder, accurately weighed, with 50 millilitres of chloroform for twenty-four hours, shaking frequently. Filter, evaporate 25 millilitres to dryness, treat the residue with 1 millilitre of ether, and pour the ether on to a small filter. Re-extract the residue four times and pour the ether through the filter, dissolving any residue on the filter in chloroform and evaporating off the chloroform before each successive extraction of the combined residues with the ether; dry and weigh the residue of elaterin.

Action and Uses.—Elaterium is a powerful hydragogue cathartic, and is usually administered in pills. It is liable to considerable variation in strength.

Dose.– 0·006 to 0·03 gramme ($\frac{1}{10}$ to $\frac{1}{2}$ grain).

ELATERINUM.—Elaterin, or momordicin, $C_{28}H_{38}O_7$, is a mixture of two crystalline isomerides, α-elaterin (60 to 80 per cent.) and β-elaterin, obtained from elaterium by boiling with alcohol, precipitating with water, purifying the precipitate by washing with ether, and recrystallising from dehydrated alcohol. α-Elaterin is lævorotatory and physiologically inert; β-elaterin is dextrorotatory and possesses a high physiological activity. Elaterin occurs in the form of odourless, minute, white scales or prismatic crystals, having a slightly acrid, bitter taste. It is insoluble in water and glycerin, slightly soluble in alcohol, benzene and ether, soluble in chloroform, and in solutions of alkalis from which it is reprecipitated by excess of acid. Sulphuric acid colours elaterin yellow, gradually changing to scarlet. A few drops of sulphuric acid added to a solution of about 0·01 gramme in 5 grammes of melted phenol produces a crimson colour, rapidly changing to scarlet. Elaterin must be carefully distinguished from the drug elaterium, and should be used with great caution, since its action is frequently followed by prostration. It does not appear to be absorbed. It is used chiefly in cardiac or renal disease, accompanied by dropsy. Elaterin is usually prescribed as Pulvis Elaterini Compositus (elaterin, 1 part, lactose, 39 parts), which is best administered in a pill with hyoscyamus. Dose.– 0·0015 to 0·006 gramme ($\frac{1}{40}$ to $\frac{1}{10}$ grain).

ELEMI
(Elemi)
Elemi

Synonym—Manila Elemi.

Elemi is an oleoresin obtained from *Canarium luzonicum* Miq. (Fam. Burseraceæ), a tree growing in Manila. The exudation, although spontaneous, is increased by hacking the bark and is removed by scraping every few days.

When fresh, elemi occurs in the form of an opaque, soft, granular, pale yellow mass, with the consistency of honey, becoming firmer, darker and more transparent on keeping. It has a fragrant, balsamic odour recalling that of a mixture of mace and fennel. The taste is spicy and bitter. When examined **microscopically,** the oleoresin is seen to contain numerous acicular crystals.

Elemi **contains** a volatile oil, about 20 to 30 per cent., consisting chiefly of terpenes, crystalline and amorphous resin acids, bryoidin, and a bitter principle. The resinous constituents are α-manelemic acid (crystalline, melting-point, 215°), β-manelemic acid (amorphous), α- and β-manamyrin (both crystalline) and manelresene.

Substitutes.—East African elemi, from *Boswellia Frereana* Birdw., occurs in stalactitic masses and pale amber-yellow fragments. A variety from the Cameroons is derived from *Canarium Schweinfurthii* Engl. Brazilian elemi, from *Protium heptaphyllum* March., occurs in almost odourless, small, brown nodules. Yucatan elemi, from *Amyris Plumieri* DC., forms hard, yellow, translucent pieces, curved on one side and having an aromatic odour; this variety is sometimes used in place of canada balsam as a microscopical mounting medium.

Action and Uses.—Elemi is used as an ingredient of ointments when a mild stimulant is required. In this form it acts in the same way as resinous substances generally, giving protection to the skin. The ointment (Unguentum Elemi) usually contains 20 per cent. of elemi in simple ointment; an ointment is also prepared containing 10 per cent. in spermaceti ointment with the addition of 5 per cent. of balsam of Peru.

EMBELIA
(Embel.)
Embelia

Embelia consists of the dried fruits of *Embelia Ribes* Burm. f., and of *E. robusta* Roxb. (Fam. Myrsinaceæ), shrubs indigenous to India, the islands of the Indian Archipelago, and East Africa.

The fruits are spherical, about 4 millimetres in diameter, and vary in colour from red to nearly black. The fruits of *E. Ribes* are warty, those of *E. robusta* are finely striated longitudinally. In both kinds a short pedicel is often present, and a small five-partite calyx; when these are removed they leave a small hole in the fruit. The pericarp is brittle, and encloses a reddish seed which is covered with a

thin membrane; on removing this, the seed is seen to be covered with light spots, which become less distinct upon soaking in water. The seed is depressed at the base, and has a horny and slightly ruminated endosperm. The drug has a slightly astringent, aromatic taste. When 0·2 gramme of powdered embelia is shaken with 5 millilitres of ether and filtered, the filtrate, with one or two drops of dilute solution of ammonia, gives a bluish-violet precipitate.

Embelia **contains** about 2·5 per cent. of embelin or embelic acid, $C_{18}H_{28}O_4$, obtainable in golden-yellow, lamellar crystals, melting at 142°, insoluble in water, soluble in alcohol, ether, chloroform, and benzene. It also contains an alkaloid, christembine, together with resin and tannin.

Action and Uses.—Embelia is used in India and in the Eastern Colonies for the treatment of tape-worm, but is stated to possess little or no anthelmintic action. It is **administered** in milk on an empty stomach, and followed by a purgative.

Dose.– 4 to 16 grammes (1 to 4 drachms).

EMETINA
(Emet.)
Emetine

$C_{29}H_{40}O_4N_2 = 480·3$

Emetine, or methylcephaëline, is an alkaloid obtained from ipecacuanha. It occurs as an amorphous, white powder, having a bitter taste; it darkens on exposure to light, gradually assuming a yellow colour. It is strongly alkaline to litmus and forms crystalline salts with acids. Its insolubility in caustic alkalis distinguishes it from cephaëline. On the addition of sulphomolybdic acid to which 0·1 per cent. of sodium chloride has been added, a bright grass-green colour is produced. Melting-point, about 74°. Specific rotation in chloroform, about −50°; in dissociated solvents the optical rotation may vary from −25° to −50°. It should be **stored** protected from light.

Slightly **soluble** in water; soluble in alcohol, ether, benzene, chloroform, fixed oils and hot light petroleum; insoluble in essential oils and solutions of caustic alkalis.

Standard.—Emetine loses, on drying in a vacuum at atmospheric temperature, not more than 1 per cent. of its weight. Ash, not more than 0·1 per cent. 0·2 gramme, dissolved in 1 millilitre of N/1 hydrochloric acid and 10 millilitres of water, complies with the limit test for cephæline in Emetinæ Hydrochloridum.

Action and Uses.—Emetine has the action of emetine hydrochloride, in which form it is generally used, but a solution containing 0·06 gramme (1 grain) of the free base in 24 millilitres (6 fluid drachms) of olive oil has been administered as an enema in chronic amœbic dysentery.

Dose.– 0·005 to 0·06 gramme ($\frac{1}{12}$ to 1 grain).

CEPHÆLINA.—Cephaeline, an alkaloid obtained from ipecacuanha, occurs as white, silky needles, becoming yellow on exposure to light. The base, crystallised from ether and air-dried, melts at about 115° to 116°. With sulphomolybdic acid it gives a purple colour, changing to prussian blue on the addition of hydrochloric acid. It is soluble in alcohol, chloroform, benzene and solutions of caustic alkalis, very sparingly soluble in light petroleum, and slightly soluble in ether (less so than emetine). Cephaeline is more toxic and a more powerful emetic than emetine. The action of cephaeline is slow and is obtained satisfactorily only by oral administration. Dose.– 0·005 to 0·01 gramme ($\frac{1}{12}$ to $\frac{1}{6}$ grain).

EMETINÆ ET BISMUTHI IODIDUM

(Emet. et Bism. Iod.)

Emetine and Bismuth Iodide

Emetine and bismuth iodide is a complex iodide of bismuth and emetine, which may be prepared by precipitating an aqueous solution of emetine hydrochloride with excess of a solution made by dissolving bismuth carbonate and potassium iodide in hydrochloric acid. It occurs as an odourless, orange-red powder having a bitter, acrid taste. It is decomposed by alkalis with formation of emetine base, which may be extracted with chloroform; the separated alkaloid gives a green colour when moistened with sulphomolybdic acid and a trace of hydrochloric acid. It should be **stored** in well-closed containers protected from light.

Soluble in acetone; insoluble in water and alcohol (95 per cent.); slightly decomposed by, but insoluble in, dilute acids; soluble, with decomposition, in concentrated acids and in alkaline solutions.

Standard, B.P.—Emetine and bismuth iodide contains not less than 25 per cent. and not more than 28 per cent. of emetine, $C_{29}H_{40}O_4N_2$, and not less than 18 per cent. and not more than 21 per cent. of Bi. Loss on drying at 100°, not more than 2 per cent.

Action and Uses.—Emetine and bismuth iodide has the action of emetine hydrochloride. It was introduced in the belief that it would resist action by the acid of the stomach, and, after passing into the intestine, would remain in contact with encysted *Entamœba histolytica*. Unfortunately, administration by the mouth produces intense nausea, frequently with vomiting; hence pills and tablets should be enteric coated. The drug may also be administered by suspending it in a small quantity of liquid paraffin, which is then floated on two or three ounces of water. A course of emetine and bismuth iodide consists of 0·2 gramme (3 grains) daily for twelve days. The drug should be given on an empty stomach, last thing at night, and, if the patient has been found intolerant to it, 0·6 millilitre (10 minims) of tincture of opium should be given thirty minutes previously.

Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

EMETINÆ HYDROCHLORIDUM

(Emet. Hydrochlor.)

Emetine Hydrochloride

$C_{29}H_{40}O_4N_2,2HCl,7H_2O = 679{\cdot}4$

Emetine hydrochloride is the hydrochloride of the alkaloid emetine, which may be obtained from ipecacuanha or by methylating cephaëline. It occurs as an odourless, colourless, crystalline powder, having a bitter taste and a neutral or faintly acid reaction. On exposure to light, it becomes faintly yellow. When mixed with a few drops of sulphomolybdic acid, a bright green colour is produced. Emetine hydrochloride should be **stored** in well-closed containers and protected from light.

Soluble in water and alcohol (90 per cent.).

Standard, B.P.—Emetine hydrochloride loses, on drying at 110°, not less than 15 per cent. and not more than 19 per cent. of its weight. Ash, not more than 0·1 per cent. It complies also with limit tests for readily carbonisable substances and for cephaëline.

Action and Uses.—Emetine hydrochloride has a markedly irritant action upon mucous membranes, and its administration by the mouth in doses of 0·006 gramme ($\frac{1}{10}$ grain) is followed by prompt emesis. Smaller doses have an expectorant action, but it is rarely administered for this purpose, since better results are obtained from powdered ipecacuanha, and the liquid extract and tincture of ipecacuanha. When it is administered parenterally, nausea and vomiting are less likely to occur. Emetine hydrochloride, and other salts of emetine, are specific in the treatment of amœbic dysentery. Hypodermic or intramuscular injections, concurrently with oral administration of emetine and bismuth iodide or emetine periodide, form the routine treatment in all cases of amœbic dysentery, and the initial injection should be made as soon as the diagnosis has been confirmed. The course consists, usually, of two injections daily of 0·03 gramme ($\frac{1}{2}$ grain), repeated until a total of about 0·6 gramme (10 grains) has been given, or until clinical symptoms have ceased and parasites have disappeared from the stools.

Encysted amœbæ, chiefly responsible for chronic amœbic dysentery, are more resistant to the action of emetine; hence it is necessary to prolong the treatment and to administer emetine hydrochloride, emetine and bismuth iodide, or acetarsol by the mouth. Owing to the slow elimination of emetine, not more than 0·75 gramme (12 grains) should be injected in one course, and if sigmoidoscopic and bacteriological observations remain positive, the injections should be stopped, and resumed after an interval of some weeks. Emetine has also been used in the treatment of chronic alcoholism. Large doses of emetine hydrochloride have been injected intramuscularly and intravenously in bilharziasis, but the initial dose for an adult should not exceed 0·03 gramme ($\frac{1}{2}$ grain). In the treatment of hepatic abscesses of amœbic origin, emetine hydrochloride should be administered intramuscularly

(1 grain in 1 to 2 fluid ounces of physiological saline solution), and also directly into the cavity after aspiration of the pus. Injections of emetine hydrochloride have also been found useful for arresting hæmoptysis. Solutions for **injection** may be sterilised by tyndallisation or by filtration, and the containers should comply with the tests for limit of alkalinity of glass. Capsules containing emetine hydrochloride should be treated with formaldehyde solution if intended for local treatment in the intestine, and pills and tablets should be enteric coated. The simultaneous administration of extract of ox bile will assist the disintegration of the salol if this has been used as the coating.

Dose.– 0·03 to 0·06 gramme (½ to 1 grain), by injection.

EMETINÆ HYDROBROMIDUM.—Emetine hydrobromide, $C_{29}H_{40}O_4N_2$, 2HBr, $4H_2O$, occurs as a white, crystalline salt. It has the action and uses of emetine hydrochloride. It is less soluble than the hydrochloride, hence it is rarely administered, although solutions containing 0·03 gramme (½ grain) in 2·5 millilitres (40 minims) are occasionally given by intramuscular injection. Dose.– 0·03 to 0·06 gramme (½ to 1 grain).

EMETINÆ PERIODIDUM.—Emetine periodide occurs as a dark purple, crystalline powder, containing about 40 per cent. of emetine; it is insoluble in water. It is administered in amœbic dysentery and, owing to the fact that it is not affected by the acid of the stomach, it does not cause nausea or vomiting. Dose.– 0·12 gramme (2 grains).

EPHEDRA

(Ephed.)

Ephedra

Synonym—Ma-Huang.

Ephedra consists of the dried, young branches of the perennial herbs, *Ephedra sinica* Stapf and *E. equisetina* Bunge, indigenous to China, and of *E. Gerardiana* Wall. (including *E. nebrodensis* Tineo) (Fam. Ephedraceæ), indigenous to India.

The drug is imported in two forms, either compressed into bales, in which case it is much broken, and the pieces of green stem show depressions where contiguous pieces have overlain, or loosely packed, when it consists of entire branches or portions of branches, which are usually attached below to pieces of the older stems. The latter are woody, wrinkled longitudinally, and of a cinnamon-brown or ashen colour; from these, smaller branches of a similar colour arise, to which are attached the narrow, glaucous, green stems, up to about 30 centimetres long, which constitute the bulk of the drug. The green stems are sub-cylindrical and sometimes ancipital; they are longitudinally striated, and usually somewhat rough to the touch, although occasionally almost smooth. The internodes vary in length from 1 to 6 centimetres, and the opposite and decussate leaves are reduced to sheaths surrounding the stem, carrying diminutive subulate laminæ, 1·5 to 4 millimetres long; occasionally the leaves occur in whorls of three. The

drug has a heavy, aromatic odour, recalling that of dried pine needles.

The diagnostic **microscopical** characters are the straight-walled, sub-rectangular, epidermal cells, with thickened outer walls, measuring about 22 to 35 microns in the radial and 9 to 25 microns in the tangential directions; the groups of 9 to 20 fibres in the ridges; the cortical parenchyma, which is about 4 to 7 cells thick, some of the cells containing small prisms of calcium oxalate; the presence of groups of 2 to 17 (usually 2 to 6) fibres in the cortex, and sometimes of a few fibres in the pith, either isolated or in groups of 2 or 3.

Ephedra **contains** *l*-ephedrine and its stereoisomeride *d*-ψ-ephedrine. The following closely related alkaloids are also present in small quantity: *l*-*N*-methylephedrine, *d*-*N*-methyl-ψ-ephedrine and nor-*d*-ψ-ephedrine. The total alkaloid present is about 1 to 2 per cent., of which about 70 per cent. is *l*-ephedrine.

Standard.—Ephedra contains not less than 1·25 per cent. of total alkaloids, calculated as $C_{10}H_{15}ON$.

Ephedra, in powder (Pulvis Ephedræ: Pulv. Ephed.), contains the constituents and possesses the diagnostic microscopical characters of Ephedra, and complies with the standard for the unground drug.

Assay.—Shake frequently during five minutes 20 grammes, in No. 40 powder, with 200 millilitres of a mixture of one volume of chloroform and 3 volumes of ether; add 10 millilitres of dilute solution of ammonia and 1 gramme of anhydrous sodium carbonate; shake at frequent intervals for four hours, and allow to stand overnight. Transfer to a percolator, and continue the percolation, first with 100 millilitres of the ether-chloroform mixture, and then with ether, until the alkaloid is completely extracted; shake the combined percolates with successive portions of 40, 30, 20, and 20 millilitres of N/3 hydrochloric acid; to the combined and filtered acid extracts, add N/1 sodium hydroxide until the liquid is only slightly acid, then add 10 grammes of anhydrous sodium carbonate and sufficient sodium chloride to saturate the liquid, and shake until dissolved. Extract the alkaline liquid with four successive portions of 60, 50, 50, and 30 millilitres of ether, and then with 25 millilitre portions of ether until the extraction of the alkaloid is complete (usually five shakings are sufficient). Allow the combined ether extracts to stand until clear, and decant through a filter into a beaker; warm, and pour off the ether from any crystals which may separate; evaporate the ether to a volume of about 10 millilitres, and then allow the residual solvent to evaporate spontaneously. Dissolve the residue in an excess of N/10 sulphuric acid, add 20 millilitres of water, and titrate the excess of acid with N/10 sodium hydroxide, using methyl red as indicator; each millilitre of N/10 sulphuric acid is equivalent to 0·01651 gramme of total alkaloids, calculated as $C_{10}H_{15}ON$.

Action and Uses.—The action of ephedra is due to the presence of ephedrine and pseudo-ephedrine (*d*-ψ-ephedrine). The two alkaloids

have a similar action on the respiratory tract, and are equally effective in asthma, but pseudo-ephedrine is said to be less liable to cause unpleasant effects, such as palpitation, tachycardia, fainting fits, constipation, and digestive disturbances. Pseudo-ephedrine is less powerful than ephedrine as a vasoconstrictor, but it stimulates the myocardium, whereas ephedrine depresses it. Ephedrine increases the coronary circulation. A combination of ephedrine and pseudo-ephedrine is superior to ephedrine alone for cardiac stimulation, in that due balance is maintained between vasoconstriction on the one hand, and myocardiac stimulation with increased coronary circulation on the other. Ephedra may be **administered** as Extractum Ephedræ Liquidum. A tincture, said to contain the two alkaloids in approximately equal proportions, and adjusted to represent ½ grain of total alkaloids in 60 minims, has been used in doses of 1·2 to 4 millilitres (20 to 60 minims) as a cardiac stimulant in the failing heart of epidemic dropsy, pneumonia, diphtheria, and septicæmia.

Preparation

Extractum Ephedræ Liquidum, B.P.C.—(Ext. Ephed. Liq.)—Liquid Extract of Ephedra. 1 in 1. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

EPHEDRINA

(Ephed.)

Ephedrine

$C_{10}H_{15}ON = 165{\cdot}1$

Ephedrine, $C_6H_5{\cdot}CH(OH){\cdot}CH(NH{\cdot}CH_3){\cdot}CH_3$, is α-hydroxy-β-methylaminopropylbenzene, an alkaloid which may be isolated from *Ephedra sinica* Stapf, *E. equisetina* Bunge, or other species of *Ephedra*. It occurs in nearly colourless, crystalline masses. The base is very deliquescent, and rapidly absorbs moisture and carbon dioxide. It is dextrorotatory in aqueous solution and lævorotatory in alcoholic solution. It melts between 35° and 42°. When 0·01 gramme is dissolved in 1 millilitre of water, a violet colour develops after the addition of 0·1 millilitre of copper sulphate solution, followed by 1 millilitre of sodium hydroxide solution; the mixture, when shaken with ether, imparts a purple colour to the ether, and the aqueous solution becomes blue. A solution of 0·1 gramme in 20 millilitres of chloroform, after standing for twelve hours, yields, on allowing the chloroform to evaporate spontaneously, a white, crystalline residue of ephedrine hydrochloride, which melts between 214° and 220°. From the salts of ephedrine the base may be liberated by adding ammonia, and extracted by shaking with successive portions of ether; spontaneous evaporation of the ether gives a residue of the base which may be dried in a desiccator; when heated it volatilises.

Readily **soluble** in water, alcohol, glycerin (about 1 in 20), olive oil (about 1 in 25) and liquid paraffin (about 1 in 100).

Standard.—Ephedrine does not melt below 35°. Specific rotation, determined on a 2 per cent. w/v solution in carbon dioxide-free water, not less than +12·5°. Ash, not more than 0·1 per cent. To 0·2 gramme in 5 millilitres of water add 0 5 millilitre of dilute nitric acid and 0·5 millilitre of silver nitrate solution; no precipitate is obtained (absence of chloride). To 0·2 gramme in 5 millilitres of water add 0·5 millilitre of dilute hydrochloric acid and 0·5 millilitre of barium chloride solution, and boil; no opalescence is produced within fifteen minutes (absence of sulphate).

Action and Uses.—The physiological effects of ephedrine are, in general, similar to those of adrenaline in moderate doses, and are due to stimulation of the myoneural junctions of the sympathetic nerve endings. Moderate doses, given either orally or hypodermically, raise the blood pressure, reinforce the action of the heart, contract the vascular system, stimulate the respiratory system, relieve bronchial spasm, contract the uterus, and dilate the pupil. Although it may stimulate the alimentary tract, it more frequently inhibits activity. Ephedrine is of low toxicity, but certain persons may display an idiosyncrasy towards the drug. The untoward symptoms that may occur are palpitation, trembling, nausea, weakness and sweating, and dermatitis. The prolonged administration of ephedrine does not appear to have any cumulative effect, and does not result in habit formation. It should be administered with caution when cardiac disorders are present, especially when there are signs of decompensation. In acute circulatory collapse, ephedrine is contra-indicated, since it may produce a further fall in blood pressure.

Ephedrine has been given largely in the treatment of asthma because of its effect in relieving bronchial spasm when administered orally. Relief is usually obtained in from twenty to thirty minutes, but this time can be reduced to from ten to fifteen minutes if ephedrine is given by subcutaneous or intramuscular injection. In hay fever, hypertrophic rhinitis and related affections, prompt relief is obtained by the local application of ephedrine solution, which constricts the nasal mucous membrane and reduces turgescence. Oral administration produces the same results, but they are less rapidly obtained and not so marked. In whooping cough, ephedrine relieves the spasmodic coughing, whooping and vomiting, although a slight cough remains. It does not influence the course of the infection. It is said to be most effective when given in conjunction with belladonna and expectorants. Ephedrine is of considerable value in checking the fall in blood pressure occurring in spinal anæsthesia; for this purpose it should be given as soon as the blood pressure shows signs of falling, since its effect is uncertain once the pressure has become low. In hyoscine and morphine anæsthesia it combats toxic symptoms without reducing the narcotic effect. In chronic hypotension due to infectious and other diseases, it

is less useful, its effect being only transitory. For routine examination with the ophthalmoscope, it forms a harmless and efficient mydriatic agent. Solutions of from 2 to 5 per cent. w/v act as a mydriatic, producing the maximum effect in from fifteen to thirty minutes. Accommodation is unaffected and, even when fully dilated, the pupil reacts to light. Mydriasis lasts from four to twelve hours.

Ephedrine has also been given to relieve the Adams-Stokes' syndrome, to relieve the nerve and joint pains in leprosy, and to relieve the pain of dysmenorrhœa. Since ephedrine contracts that portion of the bladder immediately behind the urethra, it is of value in the treatment of urinary incontinence, especially nocturnal enuresis in children. Ephedrine may be **administered** in solution, or dissolved in liquid paraffin in 1 per cent. w/v solution, and applied to the nose and throat to relieve congestion. For oral or hypodermic injection, the sulphate or hydrochloride is usually preferred.

Dose.– 0·016 to 0·1 gramme ($\frac{1}{4}$ to $1\frac{1}{2}$ grains).

Preparations

Nebula Adrenalinæ et Ephedrinæ Oleosa, B.P.C.—(Neb. Adrenal. et Ephed. Oleos.)—Oily Adrenaline and Ephedrine Spray. Adrenaline, 1 in 10,000, and ephedrine, 1 in 50, with menthol and eucalyptol, in acidified dehydrated alcohol, castor oil and arachis oil.

Nebula Ephedrinæ Composita, B.P.C.—(Neb. Ephed. Co.)—Compound Ephedrine Spray. Ephedrine, 1 per cent. w/v, with menthol, camphor, oil of thyme and light liquid paraffin.

Unguentum Ephedrinæ, B.P.C.—(Ung. Ephed.)—Ephedrine Ointment. Ephedrine, 1 per cent., in white soft paraffin.

EPHEDRINÆ HYDROCHLORIDUM

(Ephed. Hydrochlor.)

Ephedrine Hydrochloride

$C_{10}H_{15}ON,HCl = 201·6$

Ephedrine hydrochloride, $C_6H_5·CH(OH)·CH(NH·CH_3)·CH_3,HCl$, occurs in colourless, odourless crystals or crystalline powder, having a neutral reaction. It gives the reaction with copper sulphate described under Ephedrina, and when a solution of the separated base in chloroform is evaporated or allowed to stand, ephedrine hydrochloride is produced.

Soluble in water (1 in 5), alcohol (about 1 in 5) and glycerin (1 in 60); insoluble in olive oil and liquid paraffin.

Standard, B.P.—Ephedrine hydrochloride has a melting-point of 217° to 220°. Specific rotation in 5 per cent. w/v aqueous solution, −33° to −36°. Loss on drying at 100°, not more than 0·5 per cent. Ash, not more than 0·1 per cent. It complies also with a test for absence of sulphate.

Action and Uses.—Ephedrine hydrochloride has the general properties described under ephedrine, and is suitable for administration orally or by hypodermic injection. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. It is one of the salts commonly employed for the exhibition of ephedrine in aqueous solution. For application to mucous membrane, aqueous solutions of from 1 to 5 per cent. are employed; the solution may be used as a nasal spray to reduce swelling of the turbinate bodies in hay-fever and allied affections. Owing to its more prolonged effect, it is sometimes used together with adrenaline in order to supplement the rapid but transient effect of that drug. Ephedrine hydrochloride may be **administered** orally in tablets, or as Elixir Ephedrinæ Hydrochloridi. It may be incorporated in a snuff or nasal ointment.

Dose.– 0·016 to 0·1 gramme (¼ to 1½ grains).

Preparations

Elixir Ephedrinæ Hydrochloridi, B.P.C.—(Elix. Ephed. Hydrochlor.)—Elixir of Ephedrine Hydrochloride. Each fluid drachm contains ¼ grain of ephedrine hydrochloride with distilled water, glycerin, spirit of chloroform, tincture of lemon, alcohol (90 per cent.) and syrup, coloured with compound solution of tartrazine. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Nebula Adrenalinæ et Ephedrinæ, B.P.C.—(Neb. Adrenal. et Ephed.)—Adrenaline and Ephedrine Spray. Adrenaline, as solution of adrenaline hydrochloride, 1 in 8000, ephedrine hydrochloride, about 1 in 45, and glycerin of phenol, in cinnamon water.

EPHEDRINÆ SULPHAS

(Ephed. Sulph.)

Ephedrine Sulphate

$(C_{10}H_{15}ON)_2,H_2SO_4 = 428·3$

Ephedrine sulphate, $[C_6H_5·CH(OH)·CH(NH·CH_3)·CH_3]_2,H_2SO_4$, is the sulphate of the alkaloid ephedrine. It occurs in white or colourless, odourless crystals, and the aqueous solution is neutral to litmus and to methyl red. The salt usually melts between 246° and 253°, but the melting-point may be as high as 258°. The separated base responds to the copper sulphate and chloroform tests for ephedrine described under Ephedrina. 0·1 gramme in 10 millilitres of water acidified with hydrochloric acid gives a precipitate with barium chloride solution.

Soluble in water (1 in 2), alcohol (1 in 60) and glycerin (1 in 60); insoluble in olive oil and liquid paraffin.

Standard.—Ephedrine sulphate has a specific rotation, determined in 10 per cent. w/v aqueous solution, of —30° to —31·6°. Loss on drying at 100°, not more than 0·5 per cent. Ash, not more than 0·1 per cent. To 0·2 gramme in 5 millilitres of water add 0·5 millilitre of dilute nitric acid and 0·5 millilitre of silver nitrate solution; no precipitate is obtained (absence of chloride).

Action and Uses.—Ephedrine sulphate has properties similar to those of ephedrine hydrochloride, and is used for the same purposes. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·016 to 0·1 gramme ($\frac{1}{4}$ to $1\frac{1}{2}$ grains).

ERGOTA
(Ergot.)
Ergot

Synonym—Secale cornutum I.A.

Ergot is the sclerotium of the fungus, *Claviceps purpurea* Tulasne (Fam. Hypocreaceæ), developed in the ovary of the rye, *Secale cereale* Linn. (Fam. Gramineæ). The sclerotia are usually separated by sifting the rye after it has been threshed. Ergot is imported principally from Russia, Poland, Spain and Portugal. It should be thoroughly dried, and **stored** in the unground condition in a cool place.

Ergot occurs in dark blackish-violet grains about 1·5 to 4 centimetres long and from 2 to 7 millimetres thick, straight or somewhat curved, fusiform, usually indistinctly three or four-sided, each flattened face bearing a longitudinal furrow, frequently irregularly cracked; the sclerotia are brittle, and break with a short fracture, the transverse surface being white or pinkish-white, with three or four darker strands radiating from the centre.

The diagnostic **microscopical** characters are the narrow, purplish-brown, longitudinally arranged rows of rectangular cells from the outer layer; the colourless pseudo-parenchyma of the interior, consisting of small, unequal, rounded or slightly elongated cells, containing abundant fixed oil and protein, and having highly refractive, thick walls, which respond to the tests for chitin; the absence of starch, calcium oxalate crystals, spores and vascular tissues.

Ergot **contains** three alkaloids, ergotoxine, ergotinine and pseudo-ergotinine, of which ergotoxine alone has the typical pharmacological action of ergot. Ergotoxine occurs as an amorphous powder and can be crystallised from benzene, from which it separates in association with the solvent; it forms crystalline salts with acids and is converted into ergotinine by boiling with methyl alcohol. Ergotinine and pseudo-ergotinine are both crystalline, and closely resemble each other; they differ in solubility and in specific rotation, but both give rise to ergotoxine on boiling with acids. All three alkaloids are very sparingly soluble in water; they occur only in traces in aqueous extracts of ergot, but are present in acid aqueous-alcoholic extracts. Extracts of ergot contain a number of amines, of which trimethylamine, *iso*amylamine, putrescine, cadaverine, agmatine, histamine and tyramine have been identified. These are present in small amount, and

have little action when given orally. Histamine produces a powerful but transient contraction of the uterus when injected Tyramine, when injected, has a weak action on the uterus, but raises the blood pressure . The amines are probably produced by the elimination of carbon dioxide from the corresponding amino-acids Of the latter, histidine, tyrosine, aspartic acid, valine and leucine have been isolated from ergot There is clinical evidence that ergot also contains a substance, not yet identified, which causes an almost immediate but not very prolonged contraction of the uterus. Betaine, choline, acetylcholine and ergothioneine, the betaine of thiolhistidine, also occur in ergot. Other constituents include guanosine (vernine), uracil, the colouring matters sclererythrin, which gives a characteristic absorption spectrum, ergochrysin and ergoflavin, lactic, succinic and aminosecalonic acids, the sugar, trehalose, mannitol, partly free and partly as the glycoside, clavicepsin, and a polysaccharide, mannan. Ergot contains from 15 to 30 per cent. of fixed oil, which yields on saponification about 1 per cent. of sterols, of which ergosterol and dihydroergosterol have been characterised. The presence of vitamin D has also been recorded. The drug yields from 2 to 5 per cent. of ash, of which potassium acid phosphate is the chief constituent. Ergotamine and ergotaminine are crystalline alkaloids, the occurrence of which in the official ergot is controversial They can be isolated from ergots of grasses, such as *Festuca*. Ergotamine has the same pharmacological action as ergotoxine It can be converted into ergotaminine by heating with alcohol, and the reverse change can be effected by boiling with acids Ergotamine forms crystalline salts, and is closely related to ergotoxine Ergotaminine, like ergotinine, has but little pharmacological activity.

Varieties.—Portuguese and Spanish ergots contain a higher proportion of active alkaloids than the Russian and Polish varieties and may be distinguished by their larger average size. Good Spanish ergot contains from 0·1 to 0·25 per cent. of total alkaloids; Russian ergot contains much less, sometimes not more than 0·02 per cent.

Standard, B.P.—Ergot contains not less than 0·05 per cent. of the total alkaloids of ergot, calculated as ergotoxine, and not more than 2 per cent. of foreign organic matter.

Ergot, in powder, contains the constituents and possesses the diagnostic microscopical characters of the unground drug, but if stored without immediate removal of the fat, the alkaloidal content rapidly diminishes. When powdered ergot is prescribed, the standardised powder, Ergota Præparata, must be used

Action and Uses.—Ergot stimulates plain muscle, directly or indirectly, throughout the body The peripheral arterioles undergo a prolonged constriction, which causes a considerable increase of blood pressure in man The heart beats more vigorously, its systole is more complete and its output is considerably increased The action of ergot on the uterus is similar to that on other plain muscle; it augments the contraction of the fibres, and increases the general tonus of the uterine

muscle. It therefore has an emmenagogue effect in the non-gravid condition, and an ecbolic effect on the gravid uterus. Ergot is employed, almost entirely, to excite uterine contractions. It is thus largely used to check uterine hæmorrhage, and is specially valuable in the third stage of labour. For all hæmorrhage other than uterine, it may do harm by raising blood pressure. This is especially the case in hæmorrhage from the cerebral and pulmonary vessels, because these vessels are so poorly provided with vasomotor nerves that not only is the pressure in them raised by ergot, but they are dilated by the systemic constriction.

Two types of epidemic ergotism, caused by the prolonged use of ergotised rye bread, have been described, but are rarely, if ever, found together. There is a gangrenous form, which is characterised by agonising pain in the extremities, followed by dry gangrene of the peripheral parts of the body (ergotoxine action); and a second or nervous type of epidemic which is much more rare, and is characterised by paroxysmal, epileptiform convulsions. Consumption of rye bread contaminated with ergot causes burning pains and gangrene of the limbs; smaller doses produce headache, depression, twitching of the limbs, and a staggering gait.

The action of ergot when given by mouth appears to depend mainly on ergotoxine and on an unknown principle, the latter being present in the liquid extracts of both the 1914 and 1932 Pharmacopœias. The liquid extract of the British Pharmacopœia, 1914, when taken by mouth in sufficiently large doses, produces, within a few minutes, powerful uterine contractions persisting for an hour or so; the liquid extract of the British Pharmacopœia, 1932, has the same action, and is of greater value when the more prolonged action of ergotoxine is required. Ergot is usually **administered** as Ergota Præparata, in capsules, or as extract, liquid extract, or ammoniated tincture. When ergot, Pulvis Ergotæ, or powdered ergot is prescribed, Ergota Præparata should be dispensed. The liquid extract loses its activity very rapidly, especially when diluted in mixtures; it should therefore be given undiluted, or in mixtures freshly prepared.

Injectio Ergotæ Hypodermica, of the British Pharmacopœia, 1914, contained 33 per cent. w/v of extract of ergot and 1 per cent. w/v of phenol, in recently boiled and cooled distilled water, and was administered in doses of 5 to 10 minims.

HISTAMINA.–Histamine is 4-β-aminoethylglyoxaline, $C_3H_3N_2 \cdot CH_2 \cdot CH_2 \cdot NH_2$, and may be prepared from protein decomposition products. It produces a marked fall in blood pressure and increases the frequency of uterine contractions. It is administered by injection as the acid phosphate in doses containing the equivalent of 0·001 gramme of histamine. When injected subcutaneously, it causes an increase in the gastric secretion. This effect is utilised as a diagnostic test to differentiate pernicious from secondary anæmia. A preliminary series of analyses of the gastric contents is made by the fractional-meal method, followed at a later date by the histamine test if there is complete absence of hydrochloric acid. From 0 5 to 1 millilitre of a 1 in 1000 solution of histamine phosphate is injected subcutaneously when the test meal is administered. If further analyses still show no hydrochloric acid, achlorhydria is diagnosed. The 1 in 1000 solution is also used, by means of a

skin reaction, as a diagnostic test of certain diseases with decreased circulation, such as Raynaud's disease, arterioslerosis, etc. A drop of the solution is placed on a small area of skin (on the wrist, ankles or knees), and is pricked into the epidermis with a needle, the excess of solution being wiped off. In normal patients a reddish-purple spot appears, followed by a wheal after not more than about two and a half minutes.

TYRAMINA.—Tyramine is *p*-hydroxyphenylethylamine, $C_6H_4(OH)\cdot CH_2\cdot CH_2\cdot NH_2$, a base ocurring in ergot and its extracts, but usually prepared synthetically. It resembles adrenaline in its action, but the effect is weaker and more prolonged. It has no local hæmostatic action. Tyramine has been used in the treatment of shock and collapse, being administered by injection of the solution of a soluble salt, in doses of 0·02 to 0·04 gramme ($\frac{1}{3}$ to $\frac{2}{3}$ grain).

Preparations

Ergota Præparata, B.P.—(Ergot. Præp.)—Prepared Ergot. Defatted ergot, in moderately fine powder, adjusted by admixture with exhausted ergot, or ergot of ascertained strength, to contain 0·1 per cent. of the total alkaloids of ergot, calculated as ergotoxine (limits, 0·08 to 0·12); 1 gramme contains about 0·001 gramme, and 15 grains contains about $\frac{1}{60}$ grain, of total alkaloids. It should be stored in air-tight containers. Dose.– 0·3 to 1 gramme (5 to 15 grains).

Extractum Ergotæ, B.P.C.—(Ext. Ergot.)—Extract of Ergot. A soft extract containing, when freshly prepared, 0·5 per cent. of total alkaloids, calculated as ergotoxine; 0·2 gramme contains about 0·001 gramme, and 3 grains contains about $\frac{1}{60}$ grain, of total alkaloids. Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

This extract replaces the less active extract of the British Pharmacopœia, 1914, which was prepared from ergot by maceration with water, followed by the addition of alcohol (90 per cent.), and subsequent evaporation.

Extractum secalis cornuti aquosum I.A. consists of the aqueous extract re-extracted with alcohol (60 per cent.).

Extractum Ergotæ Liquidum, B.P.—(Ext. Ergot. Liq.)—Liquid Extract of Ergot. It is prepared from defatted ergot with alcohol (50 per cent.) acidified with tartaric acid, concentration, if necessary, being effected under reduced pressure at a temperature not exceeding 40°, and is adjusted to contain, when fresh, 0·06 per cent. w/v of the total alkaloids of ergot, calculated as ergotoxine; 1·2 millilitres contains 0·0007 gramme and 20 minims contains about $\frac{1}{90}$ grain. It deteriorates rapidly on keeping and is not used when the alkaloid content has fallen below 0·04 per cent. w/v. It should be stored in small, completely filled bottles, in as cool a place as possible. Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

Extractum secalis cornuti fluidum I.A. and Extractum secalis cornuti fluidum acidum I.A. are prepared from 100 per cent. w/w of ergot.

Infusum Ergotæ Recens, B.P.C.—(Inf. Ergot. Rec.)—Fresh Infusion of Ergot. 1 in 20. When infusion of ergot or Infusum Ergotæ is prescribed, Infusum Ergotæ Recens should be dispensed. Dose.– 30 to 60 millilitres (1 to 2 fluid ounces).

This infusion was included in the British Pharmacopœia, 1914, under the name of Infusum Ergotæ.

Tinctura Ergotæ Ammoniata, B.P.C.—(Tinct. Ergot. Ammon.)—Ammoniated Tincture of Ergot. Ergot, 1 in 4, and dilute solution of ammonia, 1 in 10. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

ERGOTOXINA

(Ergotox.

Ergotoxine

Ergotoxine is an alkaloid of feebly basic properties obtained from ergot Its formula has not been definitely established It occurs as a light, white, amorphous powder, which darkens and becomes brown on exposure to light and air. It can be crystallised from benzene, from which it separates in association with two molecules of the solvent. When dissolved in sulphuric acid solution, it gives the reactions with dimethylaminobenzaldehyde and ferric chloride described under Ergotoxinæ Æthanosulphonas

Soluble in acetone, alcohol, chloroform and ethyl acetate; sparingly soluble in ether; almost insoluble in water; soluble in solution of sodium hydroxide, but insoluble in solution of sodium carbonate

Standard.—Ergotoxine has a specific rotation, determined on a 2 per cent. w/v solution of the anhydrous substance in chloroform, of not less than −180°. Loss on drying in a vacuum at 90°, not more than 5 per cent. Ash, not more than 0·1 per cent. The dry substance blackens and decomposes with evolution of gas between 190° and 200°.

Action and Uses.—Ergotoxine, when administered over considerable periods of time, produces gangrene, due to destruction of the capillary vessels and consequent arrest of blood flow. A single dose of 1 or 2 milligrams will do this in the cock's comb, and the tips of the comb drop off. Ergotoxine has the characteristic property of paralysing the motor terminations of the sympathetic nerves, leaving inhibitor terminations unaffected, a property which is employed as the basis for the biological assay of ergot. When injected intravenously into the spinal animal, it causes a rise of blood pressure and contraction of unstriated muscle in general, particularly that of the uterus. Ergotoxine is employed in obstetrics to produce contraction of the uterus in the puerperium, and differs from pituitary extract in causing a maintained spasm, so that if given before delivery, the fœtal circulation is interrupted and the child may die. It should be given, therefore, only after parturition. Following hypodermic injection, there is a latent period of twenty or thirty minutes, so that immediate cessation of hæmorrhage is not produced. The effect lasts for a long time, and if an initial dose given by injection is followed by oral doses two or three times a day during the puerperium, the contraction of the uterus will then be maintained and loss of blood avoided. Ergotoxine is also employed to control menorrhagia. Overdosage is indicated by headache, depression and vomiting. When given by mouth, ergotoxine is absorbed slowly. It is **administered** in the form of its salts, such as the phosphate or ethanesulphonate.

ERGOTAMINA.—Ergotamine is an alkaloid of feebly basic properties. It crystallises in white or colourless plates, which darken readily on exposure to light and air. On heating, it decomposes at 213° to 214°. A solution of the alkaloid in

chloroform is strongly lævorotatory. The colour reactions are the same as those described under ergotoxine. It is identical in pharmacological action with ergotoxine, but chemically it is a distinct alkaloid. It is insoluble in light petroleum, soluble in alcohol, acetone and chloroform, sparingly soluble in ether, soluble in sodium hydroxide solution, but insoluble in sodium carbonate solution.

ERGOTAMINÆ TARTRAS.—Ergotamine tartrate occurs in colourless, rhombic crystals, which contain solvent of crystallisation On heating, it decomposes between 177° and 184°. It is sparingly soluble in water and alcohol.

ERGOTININA.—Ergotinine is an alkaloid of feebly basic properties. It occurs in colourless needles, which darken and become brown on exposure to light and air. The colour reactions are the same as those of ergotoxine. The solution in alcohol or chloroform is strongly dextrorotatory. It blackens and decomposes, with evolution of gas, at about 239°. Crystalline salts have so far not been described. Mayer's reagent produces a precipitate in an aqueous solution containing 1 in 1,000,000 of ergotinine. Ergotinine is insoluble in water, soluble in alcohol (about 1 in 300), ether (about 1 in 1000) and insoluble in sodium hydroxide solution.

ERGOTOXINÆ ÆTHANOSULPHONAS

(Ergotox. Æthanosulph.)

Ergotoxine Ethanesulphonate

Ergotoxine ethanesulphonate occurs in colourless, odourless, acicular crystals containing approximately 83·6 per cent. of the alkaloid ergotoxine, obtained from ergot. The aqueous solution has an acid reaction to litmus, and exhibits a blue fluorescence. When a 0·02 per cent. w/v aqueous solution is mixed with twice its volume of a 0·125 per cent. w/v solution of dimethylaminobenzaldehyde in sulphuric acid diluted with an equal volume of water, and the mixture exposed to light, a deep blue colour is produced slowly; when a 0·02 per cent. aqueous solution is mixed with twice its volume of a 0·125 per cent. w/v solution of dimethylaminobenzaldehyde in a 65 per cent. v/v solution of sulphuric acid containing a trace of ferric chloride, a blue colour of somewhat greater intensity is produced immediately. On the addition of one or two drops of sulphuric acid to a 0·1 per cent. w/v solution of ergotoxine ethanesulphonate in glacial acetic acid containing a trace of ferric chloride, a purplish-blue colour is produced. It should be **stored** in an atmosphere of nitrogen in sealed tubes, protected from light. Solutions are unstable, and should be stored in a cool place and protected from light.

Standard, B.P.—Ergotoxine ethanesulphonate has a specific rotation, determined on a 4 per cent. w/v solution of the anhydrous salt in a mixture of acetone (2 volumes) and water (1 volume), of +112° to +122°, and a specific rotation of the separated anhydrous base, determined on a 2 per cent. w/v chloroform solution, of not less than −180°. It contains, when anhydrous, acid equivalent to not less than 16 per cent. and not more than 16·7 per cent. of ethanesulphonic acid. Loss on drying in a vacuum at 90° to 100°, not more than 5 per cent. Ash, not more than 0·1 per cent. It complies also with limit tests for chloride and sulphate.

Action and Uses.—Ergotoxine ethanesulphonate has an action similar to that of ergotoxine, and is employed on account of its solubility and greater stability. A solution for **injection** may be sterilised by tyndallisation or by filtration, and the containers should comply with the tests for limit of alkalinity of glass. The solution should be **stored** protected from light in a cool place.

Dose.– 0·0005 to 0·001 gramme ($\frac{1}{120}$ to $\frac{1}{60}$ grain), by subcutaneous or intramuscular injection.

ERGOTOXINÆ PHOSPHAS
(Ergotox. Phosph.)

Ergotoxine Phosphate

Ergotoxine phosphate may be prepared by adding dilute phosphoric acid to a solution of the base in alcohol and allowing the salt to crystallise. It forms white or colourless needles, which darken and become brown on exposure to light and air. It decomposes at about 188°. Shaken with cold water, a typical colloidal solution is formed which is strongly opalescent and froths readily; the addition of hydrochloric acid produces a thick jelly, but acetic acid leaves the solution liquid. The aqueous solution is acid to litmus.

Soluble in boiling alcohol (1 in 18); less soluble in cold alcohol; sparingly soluble in water.

Action and Uses.—Ergotoxine phosphate has an action similar to that of ergotoxine. It has been employed as a soluble form of ergotoxine, but is being largely replaced by the more stable ethanesulphonate. A solution for **injection** may be sterilised by tyndallisation or by filtration, and the containers should comply with the tests for limit of alkalinity of glass. The solution should be **stored** protected from light in a cool place.

Dose.– 0·0005 to 0·001 gramme ($\frac{1}{120}$ to $\frac{1}{60}$ grain), by subcutaneous or intramuscular injection.

ERIODICTYON
(Eriodict.)

Eriodictyon

Synonym—Yerba Santa.

Eriodictyon consists of the dried leaves of *Eriodictyon glutinosum* Benth. (Fam. Hydrophyllaceæ), a low, evergreen shrub which grows abundantly on dry hills in California.

The leaves are oblong-lanceolate, 5 to 15 centimetres long, 1 to 3 centimetres broad; the margin is more or less incurved, irregularly serrate or crenate-dentate, the apex is acute, and the leaf narrows into

a short, broad petiole. The upper surface of the leaves is yellowish green, smooth, and covered with a brownish resin; the lower surface is whitish to yellowish-white, reticulated and densely tomentose. The texture is brittle when dry, flexible when moist. The odour is somewhat aromatic, and the taste balsamic and sweetish. The drug usually consists of leaves in small fragments, admixed with a small proportion of stems.

The diagnostic **microscopical** characters are the numerous unicellular, thick-walled, filiform covering trichomes of the under surface, about 10 microns wide and 250 microns long; the straight-walled, polygonal cells of the epidermis, with a striated cuticle; the glandular trichomes with short, unicellular stalks and globular heads having two tiers of cells, showing 6 to 8 cells in the upper tier, arranged in a circle; the numerous cluster-crystals of calcium oxalate in certain cells of the mesophyll, which has a palisade varying in thickness from 2 to 6 cells.

Eriodictyon **contains** five bodies of a phenolic nature: eriodictyol, $C_{15}H_{12}O_6$; homeriodictyol, $C_{16}H_{14}O_6$; chrysoeriodictyol, $C_{16}H_{12}O_6$; xanthoeriodictyol, $C_{18}H_{14}O_7$; eridonal, $C_{19}H_{18}O_7,H_2O$. It also contains triacontane, pentatriacontane, free formic, acetic, cerotic and other acids, glycerides of certain fatty acids, a phytosterol, a yellow volatile oil, mucin, resinoid matter and some glucose.

Standard.—Eriodictyon contains not more than 5 per cent. of its stem and not more than 2 per cent. of other foreign organic matter.

Eriodictyon, in powder (Pulvis Eriodictyonis: Pulv. Eriodict.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Eriodictyon is used as a bitter tonic and as a stimulating expectorant. It has been given in asthma, phthisis, chronic bronchitis and chronic inflammation of the genito-urinary tract. The drug is best **administered** in the form of a liquid extract [1 in 1, prepared with alcohol (25 per cent.); dose, 15 minims]. It is used sometimes to reduce the bitterness of suspensions of quinine, the liquid extract being mixed with an aromatic syrup for this purpose.

Dose.– 1 to 4 grammes ($\frac{1}{4}$ to 1 drachm).

ERYTHRITYLIS TETRANITRAS DILUTUS

(Erythrityl. Tetranit. Dil.)

Diluted Erythrityl Tetranitrate

Synonyms—Erythrityl Tetranitrate (50 per cent.); Erythrol Tetranitrate (50 per cent.).

Diluted erythrityl tetranitrate is a mixture of approximately equal weights of erythrityl tetranitrate ($C_4H_6(NO_3)_4 = 302{\cdot}1$) and lactose. Pure erythrityl tetranitrate is obtained by the nitration of erythritol, a tetrahydric alcohol obtained from various lichens such as *Roccella*

tinctoria, and occurs in hard, white, tasteless crystals, melting at about 61°. It is rapidly decomposed by heat or by exposure to sunlight, and is liable to explode on percussion; admixture with lactose renders it safe to handle. Diluted erythrityl tetranitrate is a white, odourless powder, having only the slightly sweetish taste of lactose. The lactose present is soluble in water, and the residue obtained on evaporating the solution responds to the tests for lactose. The erythrityl tetranitrate can be extracted with dehydrated alcohol; on evaporating the alcoholic solution, the erythrityl tetranitrate obtained melts at about 61°, and explodes on percussion. Diluted erythrityl tetranitrate should be **stored** in a cool place and protected from light.

Partially **soluble** in cold water and alcohol (90 per cent.).

Standard, B.P.—Diluted erythrityl tetranitrate contains not less than 47·5 per cent. and not more than 52·5 per cent. of $C_4H_6O_{12}N_4$.

Action and Uses.—Erythrityl tetranitrate lowers blood pressure by dilating the peripheral arterioles. Its action is mild and prolonged, owing to its relative insolubility. The maximum dilatation occurs in from two to three hours. It is employed when it is desirable to lower blood pressure for a considerable time, by directly dilating arterioles, and is used in angina pectoris, asthma, arteriosclerosis, nephritis, etc. Erythrityl tetranitrate is usually **administered** in the form of tablets, which should be chewed and not swallowed whole. The dose may be increased to 0·2 gramme (3 grains), or more, if necessary. When erythrityl tetranitrate is prescribed, diluted erythrityl tetranitrate must be dispensed, twice the prescribed amount being supplied.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains), representing 0·015 to 0·06 gramme (¼ to 1 grain) of pure erythrityl tetranitrate.

MANNITYLIS HEXANITRAS.—Mannityl hexanitrate, or mannitol hexanitrate, $C_6H_8(NO_3)_6$, occurs as a white, crystalline powder, but on account of its liability to explode, it is mixed usually with an inert substance such as lactose or chocolate. Its action resembles that of erythrityl tetranitrate as a vasodilator and, although it may not be as powerful, it is probably more prolonged. Dose.– 0·015 to 0·06 gramme (¼ to 1 grain).

Preparation

Tabellæ Sodii Nitritis Compositæ, B.P.C.—(Tab. Sod. Nitrit. Co.)—Compound Tablets of Sodium Nitrite. Each tablet contains ½ grain of sodium nitrite, ½ grain of diluted erythrityl tetranitrate and 1 grain of ammonium hippurate. Dose.– 1 or 2 tablets.

EUCALYPTOL

(Eucalyp.)

Eucalyptol

$C_{10}H_{18}O = 154·1$

Synonym—Cineole.

Eucalyptol is the anhydride of menthan-1:8-dial. It is obtained chiefly from oil of eucalyptus, but is found also in oil of cajuput and other

oils. It occurs as a colourless liquid with a characteristic, aromatic, camphoraceous odour and a pungent, cooling taste. Eucalyptol forms a characteristic addition product with bromine, hydrochloric acid, hydrobromic acid, or phosphoric acid. It should be **stored** in well-closed bottles in a cool place and protected from light.

Soluble in alcohol (70 per cent.) (1 in 2); miscible in all proportions with alcohol (90 per cent.), carbon disulphide and glacial acetic acid.

Standard, B.P.—Eucalyptol contains not less than 97·5 per cent. w/w of cineole, $C_{10}H_{18}O$. Specific gravity, 0·928 to 0·930. Optical rotation, $-1°$ to $+1°$. Refractive index at 20°, 1·456 to 1·460. Freezing-point, not below 0°.

Action and Uses.—Eucalyptol has the action and uses of oil of eucalyptus. It is less irritating to the mucous membrane than the oil; hence it should be used in preparations for internal administration and for inhalation. Oily spray solutions contain 1 part in from 16 to 30 parts of light liquid paraffin. Eucalyptol suspended in water (1 in 1000) with the aid of a small quantity of tincture of quillaia is sometimes used as a bladder-wash.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

EUCALYPTOL CHLORINATUM.—Chlorinated eucalyptol may be prepared by treating eucalyptol with potassium chlorate and hydrochloric acid, as described under Oleum Eucalypti Chlorinatum. Chlorinated eucalyptol is used as a solvent for dichloramine.

Preparations

Nebula Eucalyptolis Composita, B.P.C.—(Neb. Eucalyp. Co.)—Compound Eucalyptol Spray. *Syn.*—Nebula Thymolis Composita. Eucalyptol, 8 per cent. v/v, with camphor, menthol and thymol in light liquid paraffin.

Pastilli Mentholis et Eucalyptolis, B.P.C.—(Pastill. Menthol. et Eucalyp.)—Menthol and Eucalyptol Pastilles. Each pastille contains $\frac{1}{10}$ grain of menthol and $\frac{1}{2}$ minim of eucalyptol.

EUCALYPTUS

(Eucalyp.)

Eucalyptus

Synonyms—Eucalypti Folium; Eucalyptus Leaf.

Eucalyptus consists of the dried leaves of the blue gum tree, *Eucalyptus globulus* Labill. (Fam. Myrtaceæ), a large tree indigenous to Tasmania and Eastern parts of Australia, and cultivated in Southern Europe. The fresh leaves are used only for the distillation of the volatile oil. The leaves are dimorphous; those from younger plants, which are sessile, ovate, and cordate at the base, are not used in the dried state for officinal purposes.

The leaves measure about 30 centimetres in length and 4 centimetres

in width; they are ensiform, acute; entire, coriaceous, brittle and punctate; both surfaces are pale green, with minute, brown, corky spots; the petiole is short, flattened and twisted; the lateral veins anastomose to form a continuous line near the margin and parallel to it. The odour is agreeable and aromatic, and the taste is aromatic, pungent and slightly bitter.

The diagnostic **microscopical** characters are the isobilateral mesophyll; a midrib, which shows in transverse section one large crescent-shaped meristele, surmounted by two smaller vascular strands lying side by side, the whole group being surrounded by sclerenchymatous fibres; on both surfaces, numerous stomata surrounded by straight-walled, polygonal cells, which have a thick cuticle; the palisade three to four cells deep on both sides; the mesophyll, which contains numerous large, sub-spherical, schizo-lysigenous oil glands, some of which have voided their contents through the epidermis and have become lined with a layer of periderm; prismatic and cluster-crystals of calcium oxalate.

Eucalyptus **contains** from 1 to 3 per cent. of volatile oil, together with tannin, a bitter principle, and resins. It yields to alcohol (60 per cent.) about 22 to 30 per cent. of extractive.

Standard.—Eucalyptus contains not more than 1 per cent. of fruits, and not more than 2 per cent. of stems or other foreign organic matter.

Eucalyptus, in powder (Pulvis Eucalypti : Pulv. Eucalyp.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Eucalyptus is used in the form of tincture in the treatment of asthma, phthisis and chronic bronchitis.

Preparation

Tinctura Eucalypti, B.P.C.—(Tinct. Eucalyp.)—Tincture of Eucalyptus. 1 in 5. Dose.– 1 to 8 millilitres (¼ to 2 fluid drachms).

EUFLAVINA

(Euflavin.)

Euflavine

$C_{14}H_{14}N_3Cl = 259{\cdot}6$

Synonyms—Neutral Acriflavine; Neutroflavin.

Euflavine is 2 : 8-diamino-10-methylacridinium chloride. It may be prepared from acriflavine by neutralisation and precipitation with sodium chloride. It occurs as an orange-red or brownish-red powder, which dissolves in water to give an orange solution. Dilute solutions exhibit a strongly-marked green fluorescence. An aqueous solution

(1 in 100) yields a bulky, yellow precipitate on the addition of a solution of sodium salicylate, or of potassium ferricyanide solution. A concentrated aqueous solution does not effervesce on the addition of sodium bicarbonate (distinction from acriflavine). A 0·1 per cent. aqueous solution does not form a precipitate with solution of formaldehyde (distinction from proflavine).

Soluble in water; more soluble in warm water (about 1 in 4); slightly soluble in alcohol; nearly insoluble in ether, chloroform, fixed oils and liquid paraffin.

Standard.—Euflavine contains not less than 93 per cent. of $C_{14}H_{14}N_3Cl$, calculated on the substance dried at 120°. Loss on drying at 120°, not more than 7 per cent. 1 gramme, moistened with sulphuric acid and gently ignited, the residue being again moistened with sulphuric acid and re-ignited, leaves not more than 0·04 gramme of residue. A 0·2 per cent. aqueous solution remains clear on standing in the dark for twenty-four hours.

Assay.—Dissolve about 2 grammes, accurately weighed, in 250 millilitres of water, and dilute with water to 750 millilitres. Adjust the reaction of the solution; at room temperature, by the addition of N/1 hydrochloric acid, until faintly acid to congo-red paper, and then add 5 grammes of sodium acetate. Add 50 millilitres of M/10 potassium ferricyanide, stirring during the addition, set aside for ten minutes, filter through a Buchner funnel, and wash the precipitate with three successive quantities of 50 millilitres of water. To the combined filtrate and washings add separately 10 millilitres of hydrochloric acid, 10 grammes of sodium chloride, 1 gramme of potassium iodide, and 3 grammes of zinc sulphate dissolved in 10 millilitres of water, mixing after each addition. Set aside for three minutes, and titrate the liberated iodine with N/10 sodium thiosulphate, using starch mucilage as indicator. When the titration is nearly complete, allow to stand for a further three minutes, and then complete the titration. Determine by means of a blank experiment the number of millilitres of N/10 sodium thiosulphate equivalent to 50 millilitres of M/10 potassium ferricyanide and calculate the volume of M/10 potassium ferricyanide required by the euflavine; each millilitre of M/10 potassium ferricyanide is equivalent to 0·07788 gramme of $C_{14}H_{14}N_3Cl$.

Action and Uses.—Euflavine has an antiseptic action similar to that of acriflavine, and is preferred on account of its less irritant action on mucous surfaces. It is administered orally in tablets containing ½ grain, coated to prevent disintegration in the stomach; large doses of potassium citrate and dextrose are given simultaneously to minimise damage to the kidneys and liver. Carbasus Euflavinæ is used as an antiseptic dressing.

Preparation

Carbasus Euflavinæ, B.P.C.—(Carbas. Euflavin.)—Euflavine Gauze. It contains about 0·1 per cent. of euflavine.

EUGENOL

(Eugen.)

Eugenol

$C_{10}H_{12}O_2 = 164{\cdot}1$

Eugenol, or 2-methoxy-4-allylphenol, may be obtained by shaking oil of clove with excess of a solution of sodium hydroxide, drawing off the resulting solution of sodium eugenate, and decomposing by means of dilute sulphuric acid. It occurs as a colourless or slightly yellow, optically inactive liquid, which boils at about 252° and has an odour of cloves and a pungent, spicy taste. A blue colour is produced on the addition of dilute ferric chloride solution to its alcoholic solution; on oxidation with potassium permanganate, it yields vanillin. It should be **stored** in well-stoppered bottles and protected from light.

Soluble in all proportions of alcohol, ether, chloroform, and glacial acetic acid.

Standard.—Eugenol has a specific gravity of 1·072 to 1·074. Refractive index at 20°, 1·541 to 1·542. It is entirely and readily soluble in dilute solution of sodium hydroxide. 1 millilitre dissolved in 3 millilitres of sodium hydroxide solution, produces a clear solution on the addition of 27 millilitres of water, which becomes turbid on exposure to air (limit of terpenes). On the addition of 1 drop of ferric chloride solution to 5 millilitres of the solution obtained by shaking 1 millilitre of eugenol with 20 millilitres of water and filtering, a transient, greyish-green, but not blue or violet, colour is produced (absence of phenol).

Action and Uses.—Eugenol has the action and uses of oil of clove. It is used in dentistry as an antiseptic obtundent and local analgesic. A mixture with zinc oxide is used in dentistry as a temporary filling.

Dose.—0·06 to 0·2 millilitre (1 to 3 minims).

ISOEUGENOL.—Isoeugenol, $C_{10}H_{12}O_2$, may be prepared from eugenol by heating with potassium hydroxide. It occurs as a colourless or pale yellow oil having a powerful carnation-clove odour, a specific gravity of about 1·089 and a boiling-point of 112° under 4 mm. pressure. It is used in perfumery and in the manufacture of vanillin.

EUONYMUS

(Euonym.)

Euonymus

Synonym—Wahoo Bark.

Euonymus consists of the dried root-bark of *Euonymus atropurpureus* Jacq. (Fam. Celastraceæ), a shrub common in the Eastern United States.

The root-bark occurs in small, quilled or curved pieces, light in weight, from 2 to 4 millimetres thick, up to about 7·5 centimetres long and 1·5 centimetres wide. The outer surface has a soft, spongy, light ash-grey cork, marked with darker lines and patches; the inner surface is longitudinally striated, smooth and grey when free from fragments of pale yellow or buff wood. The fracture is short, and if the two pieces are separated, delicate elastic threads, formed from the contents of the secretion cells, are seen connecting them. The smoothed transverse section of the moistened bark exhibits a narrow, buff or light brown cork, a whitish cortex and darker phloem. The odour is faint, but characteristic, and the taste bitter and acrid.

The diagnostic **microscopical** characters are the thin-walled cells of the cork; the cluster-crystals of calcium oxalate, and small starch grains in the cells of the parenchyma; the elongated cells with brownish, amorphous contents, scattered throughout the cortex and phloem; the absence of prisms of calcium oxalate.

Euonymus **contains** a crystalline alcohol, euonymol, the sterols, euonysterol, homo-euonysterol and atropurpurol, furan-β-carboxylic acid, dulcitol, citrullol and a mixture of fatty acids. The bark yields to alcohol (45 per cent.), about 25 per cent. of extractive.

Substitutes.—The stem bark usually occurs in long, thin strips with a greenish-grey cork, green cortex and fibrous phloem. Wafer ash bark (*Ptelea trifoliata* Linn., Fam. Rutaceæ) differs from euonymus bark in being thicker, in bearing long, transverse, whitish scars, and in exhibiting, in transverse section, a layer of sclerenchyma within the cork and large oleo-resin cells in the phloem.

Standard.—Euonymus contains not more than 5 per cent. of adhering wood, and not more than 2 per cent. of other foreign organic matter. Acid-insoluble ash, not more than 4 per cent.

Euonymus, in powder (Pulvis Euonymi : Pulv. Euonym.), contains the constituents and possesses the diagnostic microscopical characters of Euonymus, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Euonymus is a mild cathartic and is said to increase the flow of bile; since the drug is not absorbed, this cannot be due to a specific effect upon the liver, but is probably due to a reflex contraction of the gall bladder, an effect common to all purgatives which irritate the duodenum. It is **administered** in the form of extract, tincture, and as an elixir with pulsatilla. The extract is made into pills with syrup of liquid glucose, or combined with iridin or the extracts of cascara sagrada, hyoscyamus, or nux vomica; it is also prepared in tablet and capsule form, especially with cascara sagrada.

Preparations

Elixir Euonymi et Pulsatillæ, B.P.C.—(Elix. Euonym. et Pulsat.)—Elixir of Euonymus and Pulsatilla. Tincture of euonymus and tincture of pulsatilla, of each 1 in 8, with simple elixir. Dose.—1 to 16 millilitres (1 to 4 fluid drachms).

Extractum Euonymi, B.P.C.—(Ext. Euonym.)—Extract of Euonymus. *Syn.*—Euonymin; Brown Euonymin. The alcoholic percolate evaporated to dryness, and mixed with one-fourth its weight of calcium phosphate. Dose.—0·06 to 0·12 gramme (1 to 2 grains).

This extract was included in the British Pharmacopœia, 1914.

Liquor Euonymini et Iridini, B.P.C.—(Liq. Euonym. et Iridin.)—Solution of Euonymin and Iridin. It contains the equivalent of about 3·5 per cent. w/v of extract of euonymus and about 2 per cent. w/v of extract of iris, with potassium carbonate, distilled water and alcohol (45 per cent.). Dose.—2 to 4 millilitres (½ to 1 fluid drachm).

Liquor Euonymini et Pepsini, B.P.C.—(Liq. Euonym. et Pepsin.)—Solution of Euonymin and Pepsin. Each fluid drachm contains 1 grain of extract of euonymus and 2 grains of pepsin, with hydrochloric acid, alcohol (45 per cent.) and chloroform water. Dose.—2 to 4 millilitres (½ to 1 fluid drachm).

Tinctura Euonymi, B.P.C.—(Tinct. Euonym.)—Tincture of Euonymus. 1 in 5. Dose.—0·6 to 2·6 millilitres (10 to 40 minims).

EUPHORBIA
(Euphorb.)
Euphorbia

Synonyms—Euphorbia Herb; Euphorbia Pilulifera.

Euphorbia is the dried, entire plant, *Euphorbia hirta* Linn. (Fam. Euphorbiaceæ), an annual herb indigenous to the hotter parts of India, and growing in most tropical countries. The plant is collected while flowering and fruiting.

The root is a conical tap-root about 5 millimetres in its greatest diameter, and bearing about four vertical rows of fibrous rootlets. The stem is slender and terete, and covered with coarse, bristly hairs of two kinds; it bears opposite, dark green leaves from 2 to 4 centimetres long, ovate or obliquely lanceolate in shape, with a dentate margin. Both surfaces are hairy, and the upper surface is rugose. They are brittle and usually much broken in the drug, and when held to the light they show pellucid spots. The flowers are small, numerous, and crowded together in dense cymes about 1 centimetre in diameter. The fruit is a yellow, three-celled, keeled capsule about 1 to 2 millimetres in diameter, containing three reddish-brown, four-sided, angular, wrinkled seeds. The drug has a bitter taste.

Euphorbia **contains** amongst the water-soluble constituents, gallic acid, quercetin, a phenolic substance, an amorphous glycoside and a sugar. The portion soluble in alcohol, but insoluble in water, contains triacontane, a monohydric alcohol, euphosterol, a phytosterol and phytosterolin, jambulol, melissic acid and a mixture of fatty acids

Standard.—Euphorbia contains not more than 5 per cent. of foreign organic matter. Acid-insoluble ash, not more than 3 per cent.

Euphorbia, in powder (Pulvis Euphorbiæ : Pulv. Euphorb.), contains the constituents and possesses the diagnostic microscopical characters

of Euphorbia, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Euphorbia has a depressant action upon the heart and respiration, and causes relaxation of bronchi by central action. It is **administered** in the form of liquid extract or tincture (Tinctura Euphorbiæ, 1 in 5; dose, 10 to 30 minims) with lobelia or senega, in asthmatic conditions, chronic bronchitis, emphysema, coryza and hay fever.

EUPHORBIA PEPLUS.—Petty spurge, or devil's milk, is the entire plant, *Euphorbia Peplus* Linn., which is indigenous to the British Isles. It is a slender annual with a procumbent, sometimes erect, stem, having minute stipules to the leaves on the floral axes, and involucral bracts with very long cusps. A tincture and a liquid extract have been recommended in asthma and bronchial catarrh.

Preparation

Extractum Euphorbiæ Liquidum, B.P.C.—(Ext. Euphorb. Liq.)—Liquid Extract of Euphorbia. *Syn.*—Extractum Euphorbiæ Piluliferæ Liquidum. 1 in 1. Dose.– 0·12 to 0·3 millilitre (2 to 5 minims).

EUPHORBIUM
(Euphorbium)

Euphorbium

Euphorbium is the dried latex obtained by incision from the stem of *Euphorbia resinifera* Berg. (Fam. Euphorbiaceæ). The plant is common in the mountainous districts of Morocco.

The dried latex occurs in dull, yellowish-brown tears, or small irregular masses, up to about 1·5 centimetres wide, many of which are perforated owing to the solidification of the latex around a pair of stipules; in some cases the stipules are still embedded in the masses, as also are portions of the fruits and inflorescences. Admixed with the drug may be found fragments of the stem with stipules attached, the tri-locular fruits, consisting of three almost equal, one-celled, keeled carpels, attached to a central axis, and a few of the typical cyathia. It is very brittle, almost odourless, has an acrid taste, and the powder is strongly sternutatory. Euphorbium may be identified by the following test :—Shake 4 millilitres of light petroleum with 3 grammes of a mixture of powdered euphorbium with twice its weight of sand, filter, and pour a little of the filtrate on the surface of 2 millilitres of a mixture of 1 volume of nitric acid and 400 volumes of strong sulphuric acid; a blood-red ring is formed at the junction of the liquids.

Euphorbium **contains** euphorbone, a colourless, crystalline principle melting at 115° to 116° (about 40 per cent.), euphorbo-resene, a yellowish-brown, amorphous substance (about 20 per cent.), euphorbic acid, calcium malate (about 25 per cent.), and an acrid principle, soluble in water, alcohol and ether, to which the physiological action is due.

Euphorbium yields to alcohol (90 per cent.) about 50 per cent. of extractive.

Standard.—Euphorbium yields not more than 10 per cent. of ash.

Action and Uses.—Euphorbium is emetic and powerfully cathartic. On account of its violent action it is not used internally. Acute nephritis may follow the introduction of the drug into the system. Powdered euphorbium is a powerful irritant to the nasal mucous membrane, causing violent sneezing. Externally, it acts as a vesicant and as such is used in veterinary practice.

EXTRACTUM HEPATIS SICCUM

(Ext. Hepat. Sicc.)

Dry Extract of Liver

Synonym—Extract of Liver.

Dry extract of liver is a selected fraction of an alcoholic extract of ox or sheep's liver, and contains the specific principle which increases the number of red corpuscles in the blood of persons suffering from pernicious anæmia. The livers are trimmed, minced, and macerated with frequent stirring in slightly acidified alcohol (80 per cent.) for twelve to eighteen hours. The filtered liquid is reserved, and the residue macerated as before, using alcohol (50 per cent.). The two filtrates are mixed, evaporated to a small bulk under reduced pressure, mixed with alcohol and clarified. The resulting liquid extract is evaporated under reduced pressure to a syrupy consistence, and the residual water removed by repeated treatment with dehydrated alcohol. The brittle product is dried, powdered, dried again *in vacuo* and mixed with sodium chloride. Dry extract of liver occurs as a light, brown, very hygroscopic powder with a meat-like odour and salty, meat-like taste. Nothing definite is known about the nature of the active constituents present in liver extract; usually vitamins B_1 and B_2 are present, together with a heat-stable substance which is elaborated in the stomach and stored in the liver, and is capable of causing an increase in the number of red cells in the blood of patients suffering from pernicious anæmia. There is no satisfactory method of assay other than actual clinical test. It should be **stored** in hermetically sealed glass tubes in a cool place.

Soluble in water; insoluble in alcohol (90 per cent.).

Standard, B.P.—Dry extract of liver contains not less than one-tenth its weight of sodium chloride, and is packed in tubes, each tube containing the equivalent of 225 grammes of the original liver.

Action and Uses.—Liver extract is used as a substitute for raw liver in the treatment of pernicious anæmia. Its mode of action is not definitely known, but it causes a marked rise in the number of reticulated red blood cells, followed by an increase in the total red cell

count, which can in most cases be brought to the normal figure of 5,000,000 per cubic millimetre. Dosage should be controlled by reference to the red blood cell count. Some improvement is also noticeable in the nervous symptoms due to peripheral neuritis, but in subacute combined degeneration of the spinal cord there is no regeneration of the damaged tissues. In secondary anæmia, treatment with liver extract is less satisfactory, but when it is given in conjunction with large doses of iron salts considerable improvement may result. Symptomatic improvement in disseminated sclerosis is said to have followed the administration of large doses of liver. In sprue associated with anæmia and a high colour index, liver extract has given good results and produced undoubted clinical cures. It is useful also in other so-called macrocytic hyperchromic anæmias, such as the pernicious anæmia of pregnancy and anæmias due to the presence of tape-worms and hook-worms.

The toxic effects produced by certain heavy metals are counteracted by liver extract; thus it has been administered for the dermatitis following the injection of arsenic and bismuth preparations. Early cases of manganese poisoning are said to have responded satisfactorily to liver therapy, and intramuscular injections of liver extract are used to prevent nausea and vomiting in patients undergoing X-ray treatment. Extractum Hepatis Siccum and Extractum Hepatis Liquidum are suitable preparations of liver for oral administration. Fractional extracts of liver suitable for intramuscular or intravenous injection have been obtained, and the use of such preparations has been followed by a rapid and marked increase in the number of red cells in the circulation. Liver extract given by injection produces the desired response with smaller doses administered at longer intervals.

Dose.– The quantity equivalent to 225 grammes (about half a pound) of fresh liver.

EXTRACTUM HEPATIS LIQUIDUM, B.P.—(Ext. Hepat. Liq.)—Liquid Extract of Liver. It is prepared by the method described for the dry extract, the solid precipitated by dehydrated alcohol being mixed with distilled water, glycerin and alcohol (95 per cent.). 30 millilitres is equivalent to 240 grammes of fresh liver, or 1 fluid ounce to 8 ounces of fresh liver; it contains also not less than 10 per cent. v/v of alcohol (95 per cent.) and 20 per cent. v/v of glycerin. It should be stored in well-closed containers in a cool place, but since it may lose activity on keeping it should be used as soon as possible after preparation. The label should state the weight of fresh liver equivalent to 30 millilitres or to 1 fluid ounce. Dose.– 30 millilitres (1 fluid ounce).

EXTRACTUM MALTI

(Ext. Malt.)

Extract of Malt

Extract of malt is obtained from sound, malted grain of barley, *Hordeum distichon* Linn. (Fam. Gramineæ). It may be prepared by

macerating coarsely powdered malt with an equal weight of water for six hours, after which the marc is mixed with four times the original weight of water heated to about 30°, and the mass is allowed to digest for an hour at a temperature not exceeding 55°. It is then strained and pressed and the mixed liquids rapidly evaporated under reduced pressure, at a temperature not exceeding 55°, until a viscous product is obtained. Extract of malt occurs as an amber-coloured or yellowish-brown, viscous liquid with an agreeable, characteristic odour and a sweet taste. It **contains** maltose (50 per cent. or more) and dextrin, with dextrose, small proportions of other carbohydrates and diastase. Extract of malt should be **stored** in well-closed vessels in a cool place.

Standard, B.P.—Extract of malt contains nitrogen equivalent to not less than 4·5 per cent. by weight of protein. Specific gravity, 1·40 to 1·42. Refractive index at 20°, 1·4892 to 1·4976. Arsenic limit, 1·4 parts per million. It is miscible in all proportions with water, forming a translucent solution.

Action and Uses.—Extract of malt has nutritive and laxative properties. Its nutritive action depends upon the presence of carbohydrates and of the complex, water-soluble vitamin B. Extract of malt is known to be a good source of the antineuritic factor B_1. It is unlikely that diastase, a normal, but exceedingly variable, constituent of extract of malt, exerts any appreciable action during the digestion of food; the amount ingested is small compared with that of the starch-hydrolysing enzymes already present in the gut (see Diastasum). Extract of malt is digested easily, and may be **administered** undiluted to children, or a preparation of malt extract with cod-liver oil, halibut-liver oil, solution of irradiated ergosterol, or solution of vitamin A may be given. Malt extract is a useful vehicle for the administration of extract of cascara sagrada and salts of iron.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Preparations

Extractum Malti cum Oleo Morrhuæ, B.P.—(Ext. Malt. c. Ol. Morrh.)—Extract of Malt with Cod-liver Oil. Cod-liver oil, 10 per cent. w/w, in extract of malt. It contains approximately 15 per cent. v/v of cod-liver oil; 16 millilitres contains about 2·5 millilitres, and 4 fluid drachms contains about 36 minims. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

This extract was included in the British Pharmaceutical Codex, 1923.

Extractum Malti cum Oleo Olivæ, B.P.C.—(Ext. Malt. c. Ol. Oliv.)—Extract of Malt with Olive Oil. Olive oil, approximately 15 per cent. v/v, in extract of malt. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Extractum Malti Ferratum, B.P.C.—(Ext. Malt. Ferrat.)—Ferrated Extract of Malt. It contains 1·5 per cent. of soluble iron pyrophosphate. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Malti Liquidum, B.P.C.—(Ext. Malt. Liq.)—Liquid Extract of Malt. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Malti Liquidum cum Glycerophosphatibus, B.P.C.—(Ext. Malt. Liq. c. Glycerophosph.)—Liquid Extract of Malt with Glycerophosphates. 4 fluid drachms contains the equivalent of 2 grains of potassium glycerophosphate and 2 grains of sodium glycerophosphate. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Malti Liquidum cum Hæmoglobino, B.P.C.—(Ext. Malt. Liq. c. Hæmoglob.)—Liquid Extract of Malt with Hæmoglobin. *Syn.*—Malt and Hæmoglobin. Hæmoglobin, 1 in 8, in glycerin and liquid extract of malt. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Malti Liquidum cum Hypophosphitibus, B.P.C.—(Ext. Malt. Liq. c. Hypophosph.)—Liquid Extract of Malt with Hypophosphites. 4 fluid drachms contains 1 grain of sodium hypophosphite and 1 grain of calcium hypophosphite in liquid extract of malt. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Malti Liquidum cum Quinina et Strychnina, B.P.C.—(Ext. Malt. Liq. c. Quinin. et Strych.)—Liquid Extract of Malt with Quinine and Strychnine. 4 fluid drachms contains about $\frac{1}{2}$ grain of quinine hydrochloride and $\frac{1}{4}$ grain of strychnine hydrochloride. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Malti cum Vitaminis, B.P.C.—(Ext. Malt. c. Vitamin.)—Extract of Malt with Vitamins. Solution of vitamin A, 1·0 per cent. w/w, and solution of irradiated ergosterol, 1·5 per cent. w/w, in extract of malt. It is about 3 times as potent as extract of malt and cod-liver oil; 4 millilitres (1 fluid drachm) contains about 3000 units of vitamin A and 225 units of antirachitic activity (vitamin D). Dose.– 8 to 30 millilitres ($\frac{1}{4}$ to 1 fluid ounce).

Extractum Malti Liquidum et Medullæ Rubræ, B.P.C.—(Ext. Malt. Liq. et Medull. Rub.)—Liquid Extract of Malt and Red Bone Marrow. Liquid extract of malt and extract of red bone marrow, equal parts. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Mistura Ferri cum Malto, B.P.C.—(Mist. Ferr. c. Malt.)—Mixture of Iron with Malt. Each fluid drachm contains 3 grains of soluble iron pyrophosphate with distilled water and liquid extract of malt. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

EXTRACTUM PARATHYROIDEI
(Ext. Parathyroid.)

Parathyroid Extract

Parathyroid extract is an extract prepared from the parathyroid glands, which are situated either alongside or inside the thyroid gland. The glands are dissected free from fat and connective tissue, and frozen until required; they are then immersed in 5 per cent. hydrochloric acid, and the containing vessel is placed in a bath of boiling water. After heating for a few minutes the glands are broken up under the acid, the heating is continued for an hour, and the fat, which separates as a surface layer, is removed. The extract is cooled, and sodium hydroxide is added to bring the reaction to *p*H 8·0. Hydrochloric acid is then added slowly until a maximum precipitation of protein occurs. The precipitate is separated, redissolved in alkali, reprecipitated by hydrochloric acid, and again separated. The combined liquids form an aqueous extract of the active principle, which can be sterilised by heating. Parathyroid extract is identified by its

power to raise the amount of calcium in the blood of dogs, when injected under the skin.

Standard.—There is no standard for parathyroid extract, and the unit is based on an animal reaction. The methods in common use are based on the rise in blood-calcium produced by injecting the extract into normal dogs, or dogs from which the parathyroid glands have been removed. One unit adopted is defined as one-hundredth part of the amount necessary to raise the blood-calcium of a dog weighing 20 kilograms by 5 milligrams per 100 millilitres.

Action and Uses.—Parathyroid extract raises the amount of calcium in the circulating blood by causing a withdrawal of calcium from the bones. This was discovered from the observation that osteitis fibrosa, a disease in which the bones become weak and break because of lack of calcium, is due to a parathyroid tumour from which excessive amounts of parathyroid hormone are secreted in the blood. Parathyroid extract is used to relieve the symptoms of any forms of tetany associated with the lowering of the calcium content of the blood. This may occur after the unavoidable removal of the parathyroids during operations on the thyroid. It is **administered** by hypodermic injection, and the doses are controlled by determinations of the calcium content of the blood, since hypercalcæmia may result from excessive dosage.

Dose.—20 to 40 units.

EXTRACTUM PITUITARII LIQUIDUM
(Ext. Pituit. Liq.)

Pituitary (Posterior Lobe) Extract

Synonyms—Liquor Pituitarii; Solution of Pituitary; Pituitary Extract.

Pituitary (posterior lobe) extract is the complete aqueous extract of the pituitary posterior lobes of freshly-killed oxen, sheep or pigs. The activity present in the lobes rapidly disappears unless the autolytic processes are checked by freezing the tissue. When the lobes are frozen, the active principles are stable; they are also stable in the powdered tissue after dehydration and removal of fat by acetone. The extract is prepared with 0·25 per cent. acetic acid, assayed and adjusted to the required strength and to *p*H 3, at which reaction it can be sterilised by heat without loss of activity. Tests for identity and purity are described in the British Pharmacopœia. The containers are required to comply with the conditions laid down, and the label must state the number of units per millilitre and the date of manufacture. Pituitary (posterior lobe) extract should not be used when more than eighteen months old; its rate of deterioration is least when the reaction is *p*H 3.

Standard, B.P.—Pituitary (posterior lobe) extract contains 10 units per millilitre. It complies with biological tests for activity and

sterility, and is assayed biologically by comparing its action on the uterus of a guinea-pig, under stated conditions, with that of a standard preparation which, for Great Britain and Northern Ireland, is kept in the National Institute for Medical Research, London. The potency is expressed in units which have been adopted by international agreement. The unit is defined as the amount of activity present in 0·5 milligram of the standard. Pituitary (posterior lobe) extract, and other aqueous solutions of one or more of the separated active principles of the posterior lobe, are controlled by regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—The pharmacological action of pituitary (posterior lobe) extract is not yet fully understood. It was formerly believed to be a stimulant of all unstriped muscle (muscle like that of the intestines, not under voluntary control), but it is now known that its action is, in the main, limited to the muscle of certain organs, and in particular that of the uterus and the arterial blood vessels. It has very little direct stimulant action on intestinal muscle, and its effect in paralytic ileus may be secondary to an increased outflow of bile. Pituitary (posterior lobe) extract, when injected, promotes the flow of milk from the mammary gland by its action on the plain muscle. There is, however, no increased secretion of milk. In the parturient uterus, moderate doses of pituitary (posterior lobe) extract increase the rate and force of the natural contractions, which are intermittent; the alternation of contraction and relaxation is not interrupted, as it is by the injection of ergotoxine. By its action on the walls of the arteries, an action which is exerted not only on the large but also on the small vessels, pituitary (posterior lobe) extract raises the blood pressure; this is accompanied by a slowing of the pulse rate. Its main uses are in midwifery, in post-operative ileus, in diabetes insipidus, and to raise the blood pressure of persons suffering from shock.

In midwifery, pituitary (posterior lobe) extract is used mainly after the delivery of the child to prevent hæmorrhage; it appears to cause great constriction of the blood vessels in the uterus at the placental site. It is also used before the birth of the child, when the *os uteri* is fully dilated, to assist the contractions of a sluggish uterus. For this purpose the dose should not exceed 2 units. In midwifery, before the delivery of the child, the dose is 2 units, and for post-partum hæmorrhage, 5 units.

In post-operative intestinal stasis, or paralytic ileus, pituitary (posterior lobe) extract is of value in assisting the intestines to recommence peristalsis, and to cause evacuation of the bowels after an abdominal operation. In diabetes insipidus, the patient excretes a large volume of very dilute urine, and drinks large quantities of water to replace the loss. The injection of pituitary (posterior lobe) extract results in the excretion of a much smaller volume of more concentrated urine. In diabetes insipidus, doses of 10 units or more are often needed. The extract is used to raise the blood pressure in the treatment of surgical shock, but its value for this purpose is doubtful. For intravenous

injection in the treatment of shock, the extract should be diluted with normal saline solution. Pituitary (posterior lobe) extract can be administered by application on pledgets of wool to the back of the nose, where it is absorbed through the nasal mucous membrane, but accuracy of dosage is not possible by this route.

Dose.– 2 to 5 units (0·2 to 0·5 millilitre), by subcutaneous injection.

OXYTOCIC PRINCIPLE OF THE PITUITARY POSTERIOR LOBE is a solution of the separated active principle which possesses the power of stimulating the musculature of the uterus and is almost without effect on the blood pressure.

PRESSOR PRINCIPLE OF THE PITUITARY POSTERIOR LOBE is a solution of the separated active principle which has little action on the uterus but raises the blood pressure, relieves the polyuria of diabetes insipidus and also relieves post-operative intestinal stasis.

PITUITARY (ANTERIOR LOBE) EXTRACT is the active extract of the anterior lobe, commonly made for experimental purposes by allowing the minced fresh tissues to stand overnight with N/40 sodium hydroxide; the next day the reaction is adjusted to *p*H 7·2, and a clear fluid obtained by using a centrifuge. This crude extract can be purified by precipitating protein with sodium sulphate, and the clear fluid may be sterilised by passing it through a bacteria-proof filter. An extract so prepared has three important properties. When injected, it can accelerate growth in the young animal, or cause the fully-grown animal to begin to grow again; it can bring about precocious sexual maturity in young female rats which have just been weaned; it can cause menstruation in monkeys. The phenomenon of precocious sexual maturity in the young animal is manifested by the ripening of egg-follicles in the ovaries, by ovulation and by the formation of corpora lutea. An extract having the properties of stimulating the growth of the ovarian follicles and the corpora lutea, when injected into immature female rats, may be obtained from the urine of pregnant women, which contains, in addition to oestrin, a hormone closely resembling the gonadotropic hormone of the anterior pituitary and called the anterior-pituitary-like hormone. The active substance can be precipitated by phosphotungstic acid in presence of sulphuric acid, after removal of protein from the urine by the addition of sulphosalicylic acid. The phosphotungstic acid precipitate is extracted with dilute ammonia, which dissolves the active substance. The excess of phosphotungstic acid is removed and the active substance precipitated by alcohol, dehydrated by alcohol and ether, and dried. For use, it is dissolved in water and adjusted to *p*H 7·0 to 7·5. Injection of anterior pituitary sex hormone, in small repeated doses, into immature female rats causes precocious sexual development, shown by enlargement and rupture of the ovarian follicles with discharge of the ova, followed by the development of corpora lutea. At present there is insufficient evidence to say whether these effects are produced by one or by two hormones, but the balance of experimental evidence points to the conclusion that there is only one hormone responsible for both effects, small doses producing ripening of the follicles and large doses producing the formation of corpora lutea. The solution does not produce oestrus in ovariectomised rats (distinction from oestrin), nor does it stimulate the growth of the follicles in hypophysectomised animals. A solution of the anterior pituitary sex hormone, in relatively small doses, has been suggested for use in functional amenorrhœa, and, in larger doses, in metrorrhagia and menorrhagia. It is also employed in the treatment of climacteric hæmorrhage and threatened abortion. The potency of the solution is judged by the amount necessary to cause the formation of corpora lutea when injected into immature female rats. The age of the rats and the time at which they normally become sexually mature influence the results of the assay. The technique differs in different laboratories and no international standard has yet been adopted. In addition to the growth-promoting and gonadotropic actions, the anterior lobe of the pituitary gland is believed to elaborate other hormones which exert actions on the thyroid gland, the parathyroid glands, the pancreas and the mammary glands.

EXTRACTUM SUPRARENALI CORTICIS

(Ext. Suprarenal. Cort.)

Extract of Suprarenal Cortex

Synonym—Cortin.

Extract of suprarenal cortex is an extract containing the specific principle of suprarenal cortex which, when injected, prolongs the life of cats or dogs from which the suprarenal glands have been removed. Fresh minced glands are extracted with alcohol (95 per cent.) and the extract is concentrated by removal of alcohol under reduced pressure between 50° and 60°. The concentrate is extracted with benzene and the benzene removed at a temperature between 45° and 50°. The residue is treated with acetone and the acetone removed at the same temperature. The residue from the acetone solution is further purified by shaking with a mixture of 30 millilitres of light petroleum, 74 millilitres of alcohol (95 per cent.) and 26 millilitres of water; the light petroleum dissolves inert material, while the active material dissolves in the alcohol. The alcoholic solution is concentrated and distilled water is added to the concentrate. When this solution is allowed to stand in the refrigerator, a deposit forms; this is removed by means of a centrifuge, the supernatant fluid is decanted and sterilised by filtration through a bacteria-proof filter. The extract should be free from more than traces of adrenaline. It does not contain vitamin C.

Standard.—The extract may be standardised by its power to keep cats or dogs alive when both suprarenal glands have been removed; an extract efficiently prepared should do this when 1 millilitre is given twice a day by subcutaneous injection.

Action and Uses.—Extract of suprarenal cortex is used in the treatment of Addison's disease, which is associated with degenerative changes in the cortex of the suprarenal gland. The use of suprarenal cortex extract must be regarded as substitution therapy, in much the same way as that of insulin in diabetes mellitus. It supplies presumably a hormone which is deficient or absent in cases of Addison's disease and which appears to be intimately connected with sodium metabolism. Its administration in adequate dosage is followed by disappearance of nearly all the signs and symptoms characteristic of the disease, such as asthenia, anæmia, nausea, wasting, lethargy, pigmentation, etc. It is **administered** by subcutaneous, intramuscular, or intravenous injection. During the acute stage of crisis, 10 to 20 millilitres, or more, should be injected intravenously, together with large doses of normal saline and dextrose to prevent dehydration. Maintenance doses may be given subcutaneously or intramuscularly; the injection should be made slowly, or 1 per cent. of procaine hydrochloride added to the dose in order to minimise pain. Usually a high blood urea is a warning of severe insufficiency and of the need for increased dosage, but a normal blood urea is no guarantee that a crisis is not imminent. Similarly, low blood sugar, high

blood calcium and high blood phosphate are warning signs for increased dosage. It may be necessary to continue indefinitely the administration of the extract daily or several times a week. There is some evidence, however, that adequate doses appear to improve the function of the unaffected remnant of the gland, so that in some cases the maintenance dose can be reduced, and in others the treatment may be discontinued for several months. The dose must be doubled during an infection. In some cases of Addison's disease doses of sodium chloride, from 10 to 15 grammes daily, have been given instead of or to supplement extract of suprarenal cortex. Extract of suprarenal cortex is used also in the treatment of some types of neurasthenia associated with low blood pressure, low blood sugar and subnormal temperature, in doses of 2 millilitres intravenously.

Dose.– 5 to 10 millilitres (1½ to 2½ fluid drachms).

FEL BOVINUM
(Fel Bov.)
Ox Bile

Ox bile is obtained from *Bos taurus* Linn. (Fam. Bovidæ), and should be used when fresh. It occurs as a brownish or dark green, somewhat viscid liquid, with a disagreeable odour and an unpleasant, bitter taste. The specific gravity is about 1·02. Ox bile is neutral or faintly alkaline to litmus. When 0·1 gramme is dissolved in 10 millilitres of water, 0·1 gramme of sucrose dissolved in 1 millilitre of the solution, 3 millilitres of phosphoric acid added, and the mixture warmed on a water-bath, a reddish-violet to deep violet colour is produced. Ox bile contains the bile salts, sodium glycocholate and taurocholate, and the bile pigments, bilirubin, biliverdin, etc.; a mucinoid substance (nucleo-protein) is also present, together with small quantities of lecithin, cholesterol, fats, soaps, urea and mineral salts, of which the most important are sodium chloride, and calcium, iron and magnesium phosphates.

Action and Uses.—Ox bile is a cholagogue and laxative. It assists the action of the pancreatic secretion upon fats and promotes their assimilation. It is given medicinally in chronic constipation, in conditions of biliary deficiency and in intestinal dyspepsia, often with pancreatin. Ox bile increases peristalsis slightly, and an enema is sometimes used, containing ½ to 1 fluid ounce in 2 fluid ounces of warm water, to remove impacted fæces; such an enema is employed in paralytic ileus. Bile assists the action of such purgatives as jalap, aloes and rhubarb. For internal use, Extractum Fellis Bovini is preferred; it is best **administered** in capsules coated with keratin, or treated with solution of formaldehyde, and it may also be given in keratin-coated pills. It is also used as a dry powder, one part of which is equivalent to eight parts of ox bile. Ox bile is employed as a constituent of bacteriological culture media for the isolation of the typhoid group of bacteria.

Preparation

Extractum Fellis Bovini, B.P.—(Ext. Fell. Bov.)—Extract of Ox Bile. *Syn.*—Fel Bovinum Purificatum; Purified Ox Bile. Fresh ox bile is evaporated and shaken with alcohol, then set aside until the precipitate has subsided and the clear liquid evaporated to a firm extract. It should be stored in well-closed containers. Dose.– 0·3 to 1 gramme (5 to 15 grains).

FERRI ARSENAS

(Ferr. Arsen.)

Iron Arsenate

Synonym—Arseniate of Iron.

Iron arsenate may be prepared by the following process:—Dissolve 41·5 parts of ferrous sulphate in about 240 parts of boiling distilled water, and 53 parts of anhydrous sodium arsenate in about 200 parts of boiling water, and mix the two solutions; dissolve 9 parts of sodium bicarbonate in a little cold water, add the solution to the hot mixture and stir thoroughly; wash the precipitate formed on a calico filter until free from sulphates, remove most of the water it contains by pressure, and dry at a temperature not exceeding 40°. The product consists of ferrous arsenate, with ferric arsenate and some ferric oxide. It occurs as a greenish, amorphous, tasteless powder.

Insoluble in water; readily soluble in hydrochloric acid.

Standard.—Iron arsenate contains not less than 10 per cent. of ferrous iron calculated as $Fe_3(AsO_4)_2$. 0·5 gramme complies with the limit test for sulphates.

Assay.—Dissolve about 2·5 grammes, accurately weighed, in 10 millilitres of dilute sulphuric acid and 30 millilitres of recently boiled and cooled water, and titrate with N/10 potassium permanganate; each millilitre of N/10 potassium permanganate is equivalent to 0·01485 gramme of $Fe_3(AsO_4)_2$.

Action and Uses.—The medicinal properties of iron arsenate are principally those of the arsenate ion; the amount of iron in each dose is small. The salt is best **administered** in pill form, being well triturated with a small quantity of lactose and massed with syrup of liquid glucose.

Dose.– 0·004 to 0·016 gramme ($\frac{1}{16}$ to $\frac{1}{4}$ grain).

FERRI CARBONAS SACCHARATUS

(Ferr. Carb. Sacch.)

Saccharated Iron Carbonate

Saccharated iron carbonate consists of a mixture of ferrous carbonate, which may be partly oxidised, and glucose. It is prepared, as described

in the British Pharmacopœia, by adding an aqueous solution of ferrous sulphate and liquid glucose to a solution of sodium carbonate; the mixture is diluted, and the precipitate washed, drained, mixed with liquid glucose, and dried at a temperature not exceeding 100°. It occurs as an olive-brown, slightly hygroscopic powder with a faintly chalybeate taste, and gives the reactions of iron, carbonates and dextrose. It should be **stored** in well-closed containers.

Partially **soluble** in water.

Standard, B.P.—Saccharated iron carbonate contains not less than 50 per cent. of ferrous iron, calculated as ferrous carbonate, $FeCO_3$. Arsenic limit, 5 parts per million. It complies also with a limit test for sulphate.

Action and Uses.—Saccharated iron carbonate is a non-astringent chalybeate having the general properties of iron salts (see Ferri Sulphas). It is prescribed for anæmia and chlorosis, and is a suitable preparation for administration to children. It may be **administered** in cachets, pills, tablets, or capsules.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

FERRI OXIDUM SACCHARATUM.—Saccharated iron oxide may be prepared by precipitating a solution of ferric chloride with sodium carbonate, dissolving the precipitated ferric hydroxide in sucrose and sodium hydroxide solution, evaporating, and mixing the residue with sucrose. It occurs as a reddish-brown powder having a slightly ferruginous taste, and containing about 2·9 per cent. of iron. It is soluble in hot water. Saccharated iron oxide has properties similar to those of saccharated iron carbonate, and may be administered in the same dosage.

Preparations

Pilulæ Ferri Carbonatis Saccharati, B.P.C.—(Pil. Ferr. Carb. Sacch.)—Saccharated Ferrous Carbonate Pills. Each pill contains 3 grains of saccharated ferrous carbonate, and is approximately equivalent to 10 grains of pill of iron carbonate. Dose.– 1 to 3 pills.

Tabellæ Ferri Carbonatis, B.P.C.—(Tab. Ferr. Carb.)—Tablets of Iron Carbonate. *Syn.*—Blaud's Tablets. Each tablet is approximately equivalent to 5 grains of pill of iron carbonate. Dose.– 1 to 6 tablets.

Tabellæ Ferri Carbonatis et Aloini, B.P.C.—(Tab. Ferr. Carb. et Aloin.)—Tablets of Iron Carbonate and Aloin. *Syn.*—Blaud's Tablets with Aloin. Each tablet is approximately equivalent to 5 grains of pill of iron carbonate and contains also $\frac{1}{20}$ grain of aloin. Dose.– 1 to 6 tablets.

FERRI ET AMMONII CITRAS

(Ferr. et Ammon. Cit.)

Iron and Ammonium Citrate

Iron and ammonium citrate is a complex ferric ammonium citrate of uncertain composition. It may be prepared by the following process :—Dilute 100 parts of solution of ferric sulphate with four times its volume of distilled water, and add it to 160 parts of

dilute solution of ammonia previously diluted with 400 parts of distilled water, stirring constantly and briskly, and taking care that ammonia is finally in slight excess, as indicated by the odour; set aside the mixture for two hours, stirring occasionally; collect the precipitated ferric hydroxide, wash with distilled water until free from sulphates, and drain well. Dissolve 40 parts of citric acid in an equal weight of water, heat on a water-bath, add the ferric hydroxide, and stir until it has nearly all dissolved, or until the citric acid is saturated with ferric hydroxide, more being prepared, if necessary, from solution of ferric sulphate. Allow to cool, add 55 parts of dilute solution of ammonia, filter, evaporate to a thin syrup, maintaining a very slight excess of ammonia, and scale on porcelain tiles or sheets of glass at a temperature not exceeding 40°. It occurs in thin, dark red, transparent, deliquescent scales, with an astringent taste. It gives the reactions of ammonium salts and of citrates, and the residue after gentle ignition gives the reactions of iron. It should be **stored** in well-closed containers and protected from light.

Soluble in water (2 in 1); almost insoluble in alcohol (90 per cent.).

Standard, B.P.—Iron and ammonium citrate contains not less than 20·5 per cent. and not more than 22·5 per cent. of Fe. Arsenic limit, 5 parts per million. It complies also with a limit test for sulphate.

Action and Uses.—Iron and ammonium citrate has the general properties of iron salts, and is one of the most useful and most frequently prescribed of such preparations. It is one of the least astringent compounds of iron, and is often well borne when astringent preparations of iron disagree. It is used in the treatment of the microcytic hypochromic anæmias, and the effective dose may often be as large as 2 grammes (30 grains) given three times a day. It is best **administered** in mixture form, flavoured with syrup of orange and chloroform water. Without chloroform water or spirituous tinctures, solutions of iron and ammonium citrate do not keep well. For the preparation of solutions for hypodermic injection, the green variety (Ferri et Ammonii Citras Viridis) is usually employed. Iron and ammonium citrate is **incompatible** with mineral acids, fixed alkalis and vegetable astringents.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

FERRI CITRAS.—Iron citrate may be prepared by dissolving freshly precipitated ferric hydroxide in a solution of citric acid, evaporating and scaling. It occurs in thin, transparent scales of a garnet-red colour and contains about 16 per cent. of iron. It should be stored in well-stoppered bottles and protected from light. It is slowly soluble in water, more readily soluble in hot water, and insoluble in alcohol. Iron citrate has properties similar to those of iron and ammonium citrate. It may be dispensed in cachets, and is specially suitable for use in acid solutions. Dose.– 0·3 to 1 gramme (5 to 15 grains).

FERRI ET AMMONII TARTRAS.—Iron and ammonium tartrate may be prepared by dissolving freshly precipitated ferric hydroxide in a solution of ammonium tartrate and tartaric acid, evaporating and scaling. It occurs in thin, transparent, garnet-red to reddish-brown, odourless scales, having a sweetish, slightly ferruginous

taste; it is slightly deliquescent and contains about 13 per cent. of iron. It is very soluble in water, and insoluble in alcohol. Iron and ammonium tartrate has properties similar to those of iron and ammonium citrate. Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparation

Vinum Ferri Citratis, B.P.C.—(Vin. Ferr. Cit.)—Iron Citrate Wine. Iron and ammonium citrate dissolved in orange wine; 4 fluid drachms contains about 4 grains of iron and ammonium citrate. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

This wine was included in the British Pharmacopœia, 1914.

FERRI ET AMMONII CITRAS VIRIDIS

(Ferr. et Ammon. Cit. Vir.)

Green Iron and Ammonium Citrate

Green iron and ammonium citrate is made in the same way as iron and ammonium citrate, but a larger proportion of citric acid is used and only sufficient ammonia is added to produce a green solution. It occurs in green, deliquescent scales. Its solution is slightly acid in reaction. In other respects it has the characters of iron and ammonium citrate. It should be **stored** in well-closed containers and protected from light.

Soluble in water (2 in 1).

Standard.—Green iron and ammonium citrate, determined by the method of the British Pharmacopœia for Ferri et Ammonii Citras, contains not less than 14 per cent. and not more than 16 per cent. of Fe. Arsenic limit, 5 parts per million. Lead limit, 50 parts per million. 0·2 gramme, dissolved in 5 millilitres of water and boiled for one minute with 2 millilitres of hydrochloric acid, complies with the limit test for sulphates. 1 gramme dissolved in 25 millilitres of water requires not more than 4 millilitres of N/2 sodium hydroxide for neutralisation to phenolphthalein (limit of acidity).

Action and Uses.—Green iron and ammonium citrate is a suitable form for the hypodermic administration of iron. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. They should be stored protected from light. A 4 per cent. solution in sterilised water may be injected deeply, in doses of 0·5 to 1 millilitre (8 to 15 minims), every second or third day. The solution must be neutralised previously by adding ammonia until the mixture gives no red colour with methyl red or phenol red. The value of iron administered by injection is very doubtful; it appears to be absorbed after intramuscular injection even more slowly than after oral administration. There is, in fact, definite clinical evidence that the oral administration of iron in large doses is more effective than iron administered by injection in the treatment of hypochromic anæmias. The effective

dose of Injectio Ferri to cure an anæmia of ordinary severity appears to be 4 millilitres (equivalent to 14 milligrams of metallic iron) twice daily for about six weeks. The minimal toxic dose is the equivalent of about 48 milligrams of metallic iron. There is, moreover, evidence that harmful effect on the kidneys can be produced by injections of iron salts.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Preparations

Injectio Ferri, B.P.—(Inj. Ferr.)—Injection of Iron. A sterile solution containing a double citrate of iron and ammonium. 2 millilitres contains the equivalent of about 0·007 gramme of iron, or of about 0 033 gramme of iron and ammonium citrate, and 30 minims contains the equivalent of about $\frac{1}{10}$ grain of iron or of about $\frac{1}{2}$ grain of iron and ammonium citrate. Dose.– 1 to 2 millilitres ($\frac{1}{4}$ to $\frac{1}{2}$ fluid drachm), by intramuscular injection.

Injectio Ferri et Arseni, B.P.C.—(Inj. Ferr. et Arsen.)—Injection of Iron and Arsenic. It is of the same strength as injection of iron but contains also arsenic trioxide; 1 millilitre contains ·0013 gramme, and 15 minims contains about $\frac{1}{60}$ grain, of arsenic trioxide. Dose.– 0·5 to 1 millilitre (8 to 15 minims), by intramuscular injection.

FERRI ET AMMONII CITRO-ARSENIS

(Ferr. et Ammon. Citro-Arsen.)

Iron and Ammonium Citro-Arsenite

Synonyms—Ferri Citro-arsenis Ammoniatus; Ammoniated Citro-arsenite of Iron; Soluble Iron Arsenite.

Iron and ammonium citro-arsenite is a double salt of ferrous arsenite and ammonium citrate. It may be prepared by adding an ammoniacal solution of arsenic trioxide to a solution of green iron and ammonium citrate, evaporating on glass plates and scaling. In the process of scaling, part of the arsenic trioxide is oxidised to the arsenic condition. It occurs in green or yellowish-green, deliquescent scales, containing about 14 per cent. of iron and the equivalent of about 1·4 per cent. of arsenic trioxide.

Very **soluble** in water.

Action and Uses.—Iron and ammonium citro-arsenite is given by intramuscular injection in the treatment of anæmia. Solutions of the salt have been employed in leucæmia. It is preferably injected into the muscles of the gluteal region. Injectio Ferri et Arseni is a suitable form for administration by injection. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration; they should be stored protected from light.

Dose.– 0·0015 to 0·03 gramme ($\frac{1}{40}$ to $\frac{1}{2}$ grain); maximum daily dose, 0·06 gramme (1 grain).

FERRI ET MANGANI CITRAS
(Ferr. et Mang. Cit.)
Iron and Manganese Citrate

Iron and manganese citrate may be prepared by dissolving freshly precipitated ferric hydroxide and hydrated manganese oxide in solution of citric acid, evaporating the solution, scaling and drying. It occurs in reddish-brown scales and should be **stored** in well-closed containers.

Soluble in water.

Standard.—Iron and manganese citrate contains not less than 14 per cent. of Fe, and not less than 7 per cent. of Mn. Arsenic limit, 5 parts per million. Lead limit, 50 parts per million.

Assay.—For iron. Proceed by the method of the British Pharmacopœia for Ferri et Ammonii Citras, using about 0·7 gramme, accurately weighed.

For manganese. Dissolve 0·1 gramme in 25 millilitres of dilute nitric acid and boil gently until the solution is clear and oxides of nitrogen are removed. Add 12 millilitres of N/10 silver nitrate and 1 gramme of ammonium persulphate, continue heating for thirty seconds after oxidation begins and bubbles of oxygen rise freely, cool, and titrate with N/100 sodium arsenite until the pink colour disappears; each millilitre of N/100 sodium arsenite is equivalent to 0·0011 gramme of Mn.

Action and Uses.—Iron and manganese citrate is used in the treatment of secondary anæmia and chlorosis. It has been suggested that, as is the case with copper, the presence of manganese may increase the hæmoglobin-forming properties of the iron. Iron and manganese citrate is usually **administered** in solution.

Dose.– 0·2 to 1 gramme (3 to 15 grains).

FERRI ET POTASSII TARTRAS
(Ferr. et Pot. Tart.)
Iron and Potassium Tartrate

Synonyms—Ferrum Tartaratum; Tartarated Iron.

Iron and potassium tartrate may be prepared by the following process:—Dilute 100 parts of solution of ferric sulphate with four times its volume of distilled water, and add to it 160 parts of solution of ammonia diluted with 400 parts of distilled water, to precipitate ferric hydroxide as directed under Ferri et Ammonii Citras. Mix the well-drained precipitate of ferric hydroxide intimately with 33·25 parts of potassium acid tartrate, set aside for twenty-four hours and then heat the mixture to a temperature not exceeding 60°; add gradually 300 parts of distilled water, stir constantly until nothing more

will dissolve, and filter the solution Finally, evaporate the liquid to a thin syrup at a temperature not exceeding 60° and scale on porcelain tiles or sheets of glass at a temperature not exceeding 40° It occurs in thin, transparent, deep garnet-red scales, which are somewhat sweetish and ferruginous in taste. The aqueous solution, acidified with hydrochloric acid yields a blue precipitate with potassium ferrocyanide solution. 1 gramme in 10 millilitres of water, boiled with a slight excess of potassium hydroxide solution, produces a reddish-brown precipitate, and the filtered solution, acidified with acetic acid, yields, on cooling, a crystalline deposit

Slowly **soluble** in water (1 in 1); very sparingly soluble in alcohol (90 per cent.)

Standard.—Iron and potassium tartrate, determined by the method of the British Pharmacopœia for Ferri et Ammonii Citras, contains not less than 20 per cent. of Fe Arsenic limit, 5 parts per million. Lead limit, 50 parts per million. 0·25 gramme dissolved in 5 millilitres of water and boiled with 2 millilitres of hydrochloric acid complies with the limit test for sulphates

Action and Uses.—Iron and potassium tartrate is a mild chalybeate, similar in its properties to iron and ammonium citrate.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

FERRI ET QUININÆ CITRAS

(Ferr. et Quinin. Cit.)

Iron and Quinine Citrate

Iron and quinine citrate is a complex ammonium quinine ferric citrate and may be prepared by the following process:—Dilute 90 parts of solution of ferric sulphate with four times its volume of distilled water, and add it to about 144 parts of dilute solution of ammonia diluted with 360 parts of distilled water, to precipitate ferric hydroxide as directed under Ferri et Ammonii Citras. Mix 20 parts of quinine sulphate with 160 parts of distilled water, add 30 parts of dilute sulphuric acid and, when the salt is dissolved, precipitate the quinine by the addition of a slight excess of solution of ammonia; collect the precipitate and wash it with 600 parts of distilled water. Dissolve 61·5 parts of citric acid in an equal weight of water, heat on a water-bath, add the well-drained ferric hydroxide, stir until dissolved, then add the precipitated quinine and stir until dissolved. Allow to cool and add, in small quantities at a time, 30 parts of dilute solution of ammonia diluted with 40 parts of distilled water, stirring briskly and allowing the quinine which separates with each addition of ammonia to dissolve before the next addition is made. Then filter, evaporate to a thin syrup and scale on porcelain tiles or sheets of glass at a temperature not exceeding 40° It occurs in thin, greenish-yellow, deliquescent

scales, with a bitter, chalybeate taste. The aqueous solution has an acid reaction and gives a precipitate of quinine when rendered alkaline by the addition of solution of ammonia. It gives the reactions of ammonium salts and of citrates, and the residue after gentle ignition gives the reactions of iron. It should be **stored** in well-closed containers and protected from light.

Soluble in water (2 in 1).

Standard, B.P.—Iron and quinine citrate contains not less than 14·5 per cent. and not more than 15·5 per cent. of anhydrous quinine, and not less than 12 per cent. and not more than 14 per cent. of Fe. Arsenic limit, 5 parts per million. It complies also with a limit test for sulphate.

Action and Uses.—Iron and quinine citrate is a bitter chalybeate, having the general properties of iron and quinine, and is much used as a tonic and stomachic. It may be **administered** in mixtures flavoured with syrup of orange or syrup of lemon and chloroform water, or in pills massed quickly with a sufficient quantity of diluted alcohol. When prescribed with arsenic, the acid solution of arsenic should be used. Iron and quinine citrate is **incompatible** with alkalis, alkali carbonates and citrates, and with vegetable astringents.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparation

Vinum Ferri et Quininæ, B.P.C.—(Vin. Ferr. et Quinin.)—Iron and Quinine Wine. Iron and quinine citrate dissolved in sherry-type wine; 4 fluid drachms contains about 4 grains of iron and quinine citrate. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

FERRI ET STRYCHNINÆ CITRAS

(Ferr. et Strych. Cit.)

Iron and Strychnine Citrate

Iron and strychnine citrate may be prepared by dissolving freshly precipitated ferric hydroxide and strychnine in citric acid, neutralising with ammonia, evaporating at a low temperature, and scaling. It occurs in thin, transparent, green scales, with a bitter, chalybeate taste, and is deliquescent in moist air. The aqueous solution is slightly acid to litmus and, although not immediately precipitated by ammonia, is rendered darker in colour. It yields a blue colour or precipitate only when acidified with hydrochloric acid and then treated with solution of potassium ferrocyanide.

Readily **soluble** in water; partly soluble in alcohol.

Standard.—Iron and strychnine citrate contains not less than 0·95 per cent. and not more than 1·05 per cent. of strychnine, and not less than 12 and not more than 14 per cent. of Fe. Arsenic limit, 5 parts per

million. 0·2 gramme, dissolved in 5 millilitres of water and boiled for one minute with 2 millilitres of hydrochloric acid, complies with the limit test for sulphates.

Assay.—For strychnine. Dissolve about 2·5 grammes, accurately weighed, in 45 millilitres of water, add 10 millilitres of dilute solution of ammonia and extract the alkaloid completely with successive portions of chloroform. Evaporate the chloroform nearly to dryness, add 1 millilitre of alcohol and evaporate to dryness; dry at 100° and weigh the strychnine.

For iron. Evaporate the aqueous liquid from the assay for strychnine and complete the assay by the method of the British Pharmacopœia for iron in Ferri et Quininæ Citras.

Action and Uses.—Iron and strychnine citrate is used in mixture form as a bitter chalybeate in atonic dyspepsia and in anæmia.

Dose.– 0 06 to 0·2 gramme (1 to 3 grains).

FERRI FORMAS

(Ferr. Form.)

Iron Formate

$C_7H_9O_{16}Fe_3,4H_2O = 588·7$

Synonym—Ferric Formate.

Iron formate, $Fe_3(OH)_2(H\ COO)_7,4H_2O$, may be prepared by shaking freshly precipitated, moist ferric hydroxide with an excess of 25 per cent. aqueous solution of formic acid, collecting the crystals which separate, and drying in air. It occurs as fine needles or as a gritty powder, having a characteristic copper-red colour. Saturated solutions are liable to decompose in contact with air, with deposition of ferric hydroxide or basic formates.

Soluble in water (about 1 in 18), dehydrated alcohol (about 1 in 20).

Action and Uses.—Iron formate has the hæmatinic properties of other iron salts.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

FERRI GLYCEROPHOSPHAS

(Ferr. Glycerophosph.)

Iron Glycerophosphate

Synonym—Ferric Glycerophosphate.

Iron glycerophosphate may be obtained by dissolving freshly precipitated ferric hydroxide in glycerophosphoric acid in the presence of

alkali citrate, evaporating the solution and drying on glass plates at a temperature not exceeding 40°. It occurs as yellow or greenish-yellow scales.

Slowly **soluble** in water.

Standard.—Iron glycerophosphate contains not less than 13 per cent. and not more than 16 per cent. of Fe. Residue on ignition, not less than 42 per cent. Arsenic limit, 5 parts per million. Lead limit, 50 parts per million. 2 grammes dissolves in 5 millilitres of warm water, and the solution remains practically clear on dilution with 100 millilitres of cold water.

Assay.—Dissolve 1 gramme, accurately weighed, in 20 millilitres of water and 9 millilitres of hydrochloric acid, boil for fifteen seconds and cool; add 3 grammes of potassium iodide and titrate with N/10 sodium thiosulphate; each millilitre of N/10 sodium thiosulphate is equivalent to 0·005584 gramme of Fe.

Action and Uses.—Iron glycerophosphate has been recommended in neurasthenic conditions, also in secondary anæmias. The glycerophosphate portion is regarded as having no action of value and there is no reason to suppose that it possesses advantages over the simple phosphates. Iron glycerophosphate is contained in compound syrup of glycerophosphates, and may also be administered in pills or cachets. It is sometimes given hypodermically in doses of 0·03 gramme (½ grain). Solutions for **injection** may be sterilised by tyndallisation, by filtration, or by heating at 100° for thirty minutes. They should be stored protected from light.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

FERRI HYPOPHOSPHIS

(Ferr. Hypophosph.)

Iron Hypophosphite

$Fe(H_2PO_2)_3 = 250·9$

Synonym—Ferric Hypophosphite.

Iron hypophosphite may be prepared by adding a solution of sodium hypophosphite to a solution of ferric chloride containing as little free acid as possible, washing, and drying at a moderate heat. It occurs as a white or greyish-white, odourless and nearly tasteless powder. On ignition, it evolves spontaneously inflammable hydrogen phosphide gas and leaves a residue of ferric pyrophosphate.

Slightly **soluble** in water, more readily in presence of hypophosphorous acid, and, when freshly prepared, in a warm concentrated solution of alkali citrate forming a green solution.

Standard.—Iron hypophosphite contains not less than 97 per cent. and not more than the equivalent of 101 per cent. of $Fe(H_2PO_2)_3$,

calculated on the salt dried at 100°. Loss on drying at 100°, not more than 5 per cent.

Assay.—Dissolve about 1 gramme, accurately weighed, in hydrochloric acid and dilute to 100 millilitres; transfer 10 millilitres to a stoppered bottle, add 20 millilitres of hydrochloric acid, 2 grammes of potassium iodide and 50 millilitres of N/10 iodine; allow to stand in the dark for four hours and then titrate the excess of iodine with N/10 sodium thiosulphate; each millilitre of N/10 iodine is equivalent to 0·005019 gramme of $Fe(H_2PO_2)_3$.

Action and Uses.—Iron hypophosphite has the hæmatinic properties of iron salts, and is used in combination with other salts of hypophosphorous acid in wasting diseases, but has no advantage over iron salts generally. It is sometimes administered in pills or cachets, and in the form of solution it is a constituent of compound syrup of hypophosphites.

Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

Preparations

Liquor Ferri Hypophosphitis, B.P.C.—(Liq. Ferr. Hypophosph.)—Solution of Iron Hypophosphite. *Syn.*—Liquor Ferri Hypophosphitis Fortis; Strong Solution of Iron Hypophosphite. It contains the equivalent of from 8·5 to 10·5 per cent. w/v of ferric hypophosphite. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Syrupus Ferri Hypophosphitis, B.P.C.—(Syr. Ferr. Hypophosph.)—Syrup of Iron Hypophosphite. Solution of iron hypophosphite, 1 in 5, in syrup; each fluid drachm contains about 1 grain of ferric hypophosphite. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

FERRI IODIDUM

(Ferr. Iod.)

Iron Iodide

$FeI_2 = 309·7$

Synonym—Ferrous Iodide.

Iron iodide may be prepared by mixing 6 parts of iron with 17 parts of iodine and 20 parts of water, controlling the heat developed as combination takes place, in order to avoid loss of iodine, and, when the reaction is complete, heating until the solution becomes pale green. The solution is filtered while hot and rapidly evaporated in a bright iron vessel until it solidifies on cooling. When solid, it should be transferred at once to a hot, dry, stoppered bottle. It occurs as a steel-grey or reddish-brown, crystalline mass which melts at about 177°, giving off vapours of iodine. It readily becomes oxidised and should be **stored** in small, well-stoppered bottles.

Readily **soluble** in water, forming a green-coloured solution; soluble in glycerin and alcohol.

Action and Uses.—Ferrous iodide has the general properties of iron and of iodine. It is used especially in tuberculous and syphilitic conditions and is best **administered** in the form of Syrupus Ferri Iodidi. If required in solid form, it may be dispensed in pills made with the freshly prepared salt by rubbing with powdered liquorice and massing with syrup of liquid glucose.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

Preparations

Liquor Ferri Iodidi, B.P.C.—(Liq. Ferr. Iod.)—Solution of Ferrous Iodide. It contains from 53·1 to 54·2 per cent. w/v of FeI_2, and when diluted with seven times its volume of syrup, the product is equivalent to Syrupus Ferri Iodidi B.P. Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

Syrupus Ferri Iodidi, B.P.—(Syr. Ferr. Iod.)—Syrup of Ferrous Iodide. *Syn.*— Sirupus ferrosi iodidi concentratus I.A. It is prepared from iron, iodine, dilute hypophosphorous acid, distilled water and syrup, and contains 5 per cent. w/w of FeI_2 (limits, 4·75 to 5·25). 8 millilitres contains about 0·56 gramme of ferrous iodide, equivalent to about 0·1 gramme of iron; 2 fluid drachms contains about 7½ grains of ferrous iodide, equivalent to about 1⅓ grains of iron. It may be prepared by diluting 1 volume of solution of ferrous iodide with sufficient syrup to yield 8 volumes. It should be stored in well-filled, well-closed bottles of clear, white glass and exposed to light. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Sirupus ferrosi iodidi dilutus I.A. contains 0·5 per cent. w/w of ferrous iodide.

FERRI LACTAS

(Ferr. Lact.)

Iron Lactate

$C_6H_{10}O_6Fe,3H_2O = 288·0$

Synonym—Ferrous Lactate.

Iron lactate, $(CH_3·CHOH·COO)_2Fe,3H_2O$, may be prepared by digesting iron filings with lactic acid until interaction ceases, filtering and crystallising, or by decomposing a solution of calcium lactate with a solution of ferrous sulphate, filtering, removing residual calcium sulphate from the filtrate by means of alcohol, again filtering, evaporating and crystallising. It occurs as a greenish-white, crystalline powder, or in small, needle-shaped crystals and crystalline masses. It has a characteristic, but not strongly marked, odour, and a sweet, mildly chalybeate taste. Its solutions have a slightly acid reaction. On heating, iron lactate becomes brown, then black, and froths, evolving white, acrid vapours, and finally leaving a residue of ferric oxide. Iron lactate should be **stored** in well-stoppered bottles protected from light.

Soluble in water (1 in 40), boiling water (1 in 12), freely soluble, with formation of a green colour, in solutions of alkali citrates; almost insoluble in alcohol, although it may be crystallised from hot diluted alcohol.

Standard.—Iron lactate yields on ignition not less than 26·5 and not more than 28·5 per cent. of residue. Arsenic limit, 5 parts per million. 0·5 gramme complies with the limit test for sulphates. A 2 per cent. solution produces no opalescence on the addition of lead acetate solution (limit of tartaric, citric and malic acids). Boil 0·5 gramme dissolved in 20 millilitres of water with 5 millilitres of dilute solution of ammonia and filter; the filtrate, after evaporation and ignition, yields a residue which weighs not more than 0·005 gramme (limit of calcium and alkali salts). Dissolve 1 gramme in 5 millilitres of water and add 5 millilitres of hydrochloric acid and 1 gramme of potassium iodide; the iodine liberated requires for decolourisation not more than 1·5 millilitres of N/10 sodium thiosulphate (limit of ferric iron).

Action and Uses.—Iron lactate has the general properties of iron salts (see Ferri Sulphas); it is very readily assimilated and is one of the least astringent forms of iron. The powder may be administered in cachets, combined, if so desired, with bismuth, pepsin, or nux vomica. It is given to children as Syrupus Calcii Lactophosphatis cum Ferro.

Dose.– 0·12 to 0·6 gramme (2 to 10 grains).

Preparation

Syrupus Calcii Lactophosphatis cum Ferro, B.P.C.—(Syr. Calc. Lactophosph. c. Ferr.)—Syrup of Calcium Lactophosphate with Iron. Each fluid drachm contains about ½ grain of iron lactate, with potassium citrate and distilled water, in syrup of calcium lactophosphate. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

FERRI OXIDUM PRÆCIPITATUM FUSCUM

(Ferr. Oxid. Præcip. Fusc.)

Brown Precipitated Ferric Oxide

Synonyms—Ferri Peroxidum; Ferri Peroxidum Hydratum; Ferrugo; Brown Hydrated Oxide of Iron.

Brown precipitated ferric oxide is prepared by precipitation from a solution of ferric sulphate with solution of ammonia or of a fixed alkali, washing the precipitate until nearly free from sulphates, and drying at a temperature not exceeding 100°. It occurs as a brown powder containing from 80 to 90 per cent. of ferric oxide. It dissolves completely, although slowly, in hydrochloric acid diluted with an equal volume of water.

Standard.—Brown precipitated ferric oxide loses, on ignition at a dull red heat, not less than 10 per cent. and not more than 20 per cent. of its weight. Arsenic limit, 5 parts per million. The solution obtained by extracting 0·25 gramme with water complies with the limit test for sulphates. When 1 gramme is dissolved in hydrochloric acid, excess of ammonia added and the precipitate removed by filtration, the filtrate

is colourless (limit of copper), and is not rendered turbid by the addition of hydrogen sulphide solution (limit of zinc). The solution in a mixture of equal volumes of hydrochloric acid and water does not give a blue colour or precipitate with potassium ferricyanide solution (absence of ferrous salts).

Action and Uses.—Brown precipitated ferric oxide is employed medicinally for the same purposes as red oxide of iron.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

FERRI OXIDUM CALCINATUM.—Calcined iron oxide, commonly known as Ferri Sesquioxidum, may be obtained by roasting precipitated oxide of iron, or by roasting ferrous sulphate. When freshly prepared, it contains about 97 per cent. of ferric oxide, but, as usually met with, it contains about 94 per cent. It is not readily soluble in hydrochloric acid, but will dissolve on prolonged boiling. Impure ferruginous earths and other forms of ferric oxide used in the arts are known as Armenian bole ("Bole Armen"), ochre, sienna, Venetian red, colcothar, caput mortuum, vitrioli, tripoli, crocus ferri, crocus martis, polishing crocus and jewellers' rouge.

FERRI OXIDUM MAGNETICUM.—Magnetic iron oxide, commonly known as ferroso-ferric oxide, or black oxide of iron, occurs as a crystalline ore. The product obtained by precipitation from solution of ferrous and ferric salts is of indefinite composition and contains small and variable amounts of ferrous iron. It is insoluble in water or alcohol and soluble in warm diluted acids.

Preparation

Emplastrum Ferri, B.P.C.—(Emp. Ferr.)—Iron Plaster. *Syn.*—Emplastrum Roborans; Strengthening Plaster. Brown precipitated ferric oxide, about 9 per cent., with Burgundy pitch and plaster of lead.

FERRI OXIDUM PRÆCIPITATUM RUBRUM

(Ferr. Oxid. Præcip. Rub.)

Red Precipitated Ferric Oxide

Synonyms—Ferri Carb.; Ferri Subcarb.; Red Hydrated Oxide of Iron.

Red precipitated ferric oxide is prepared by precipitating a solution of ferrous sulphate with sodium carbonate, washing the precipitate until nearly free from sulphates, and drying at a temperature not exceeding 100°. It undergoes almost complete oxidation during the process of washing and drying, and occurs as a dull red powder. It is completely soluble in hydrochloric acid diluted with an equal volume of water, but only with difficulty in weaker acid. There is usually considerable effervescence during solution, owing to traces of carbonate, and the resulting solution gives a copious blue precipitate with potassium ferricyanide, due to traces of ferrous salt.

Standard.—Red precipitated ferric oxide loses, on ignition at a dull red heat, not less than 10 per cent. and not more than 20 per cent. of its weight. Arsenic limit, 5 parts per million. The solution obtained by extracting 0·25 gramme with water complies with the limit test for

sulphates. When 1 gramme is dissolved in hydrochloric acid, excess of ammonia added, and the precipitate removed by filtration, the filtrate is colourless (limit of copper), and is not rendered turbid by the addition of hydrogen sulphide solution (limit of zinc).

Action and Uses.—Red precipitated ferric oxide is employed as a hæmatinic in the treatment of secondary anæmia. It may be used as an antidote to arsenic, but the freshly precipitated hydroxide is preferable. It is also used for tinting zinc compounds in the preparation of calamine.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

FERRI PERCHLORIDUM

(Ferr. Perchlor.)

Ferric Chloride

$FeCl_3,6H_2O = 270·3$

Synonym—Iron Perchloride.

Ferric chloride may be prepared by the evaporation of a slightly acid solution of ferric chloride, and setting aside until a crystalline mass forms which is at once transferred to a well-stoppered bottle protected from light. It occurs as an orange-coloured, very deliquescent, crystalline mass, having a slight odour of hydrochloric acid and a very astringent, metallic taste. It melts at about 35·5°, and at a higher temperature is partly decomposed and partly volatilised. Anhydrous ferric chloride ($FeCl_3 = 162·2$), formed as a sublimate by heating metallic iron in a stream of chlorine, occurs in dark greenish-brown crystals which are exceedingly deliquescent.

Readily **soluble** in water, alcohol, ether and glycerin.

Standard.—Ferric chloride, determined by the method of the British Pharmacopœia for Liquor Ferri Perchloridi, contains not less than 57 per cent. and not more than 63 per cent. of $FeCl_3$. The solution obtained by dissolving 12·5 grammes in sufficient water to produce 50 millilitres complies with the tests for purity of Liquor Ferri Perchloridi. Lead limit, 50 parts per million.

Action and Uses.—Ferric chloride has the general properties of iron salts, and is powerfully astringent. It is usually **administered** as Liquor Ferri Perchloridi, but the alcoholic solution (Tinctura Ferri Perchloridi) is often preferred. Ferric chloride acts as a powerful styptic when applied locally. As an astringent paint for the throat, a solution (1 in 8) in diluted glycerin is prepared; for use as a throat spray, an aqueous solution (1 in 60) is employed. The chloride is used in the preparation of styptic wool and styptic lint; they contain about 15 per cent. of ferric chloride. Liquor Ferri Dialysati is a non-irritating

hæmatinic without astringency, and is given where astringent salts of iron tend to derange the stomach. It should be prescribed undiluted, the dose being added to water at the time of taking; or it may be prescribed with two parts of glycerin, which forms a stable solution, sometimes known as Glycerinum Ferri Dialysati. It is an excellent antidote for poisoning by arsenic, being given for that purpose in doses of 30 millilitres (1 fluid ounce). Liquor Ferri Oxychloridi possesses a very mild astringency, and is much more stable than Liquor Ferri Dialysati. It is employed as a hæmatinic, and is best diluted with glycerin and water (1 part and 3 parts).

Liquor Ferri Perchloridi Fortis is employed chiefly in the preparation of the weaker solution and of the tincture. It is used locally as a styptic to arrest bleeding from small wounds. Mixed with 3 parts of glycerin it is used as a paint for the throat; on account of the acidity of this mixture, however, a solution of the solid ferric chloride in glycerin is often preferred. Iron perchloride is **incompatible** with alkalis, iodides, astringent infusions and mucilage of acacia.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

Preparations

Antidotum Arsenum, B.P.C.—(Antidot. Arsen.)—Arsenic Antidote. It contains freshly precipitated ferric hydroxide and light magnesium oxide. Dose.– 120 millilitres (4 fluid ounces).

Glycerinum Ferri Perchloridi, B.P.C.—(Glycer. Ferr. Perchlor.)—Glycerin of Ferric Chloride. Solution of ferric chloride and glycerin, equal parts.

Liquor Ferri Dialysati, B.P.C.—(Liq. Ferr. Dialysat.)—Solution of Dialysed Iron. A colloidal solution containing the equivalent of from 3 to 4 per cent. w/v. of Fe. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Liquor Ferri Oxychloridi, B.P.C.—(Liq. Ferr. Oxychlor.)—Solution of Ferric Oxychloride. *Syn.*—Soluble Peroxide of Iron; Solution of Chloroxide of Iron; Solution of Basic Ferric Chloride. It contains the equivalent of about 3 per cent. w/v of iron. Dose.– 0 6 to 2 millilitres (10 to 30 minims).

Liquor Ferri Perchloridi, B.P.—(Liq. Ferr. Perchlor.)—Solution of Ferric Chloride. An aqueous solution containing 15 per cent. w/v of $FeCl_3$ (limits, 14·25 to 15·75), equivalent to about 5 per cent. w/v of metallic iron. Arsenic limit, 2·5 parts per million. It complies also with limit tests for copper and zinc, and sulphate. 1 millilitre contains 0·15 gramme of ferric chloride, corresponding to about 0·05 gramme of iron; 15 minims contains about 2½ grains of ferric chloride, equivalent to about ¾ grain of iron. It may be prepared by diluting 1 volume of strong solution of ferric chloride with sufficient distilled water to produce 4 volumes. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Liquor Ferri Perchloridi Fortis, B.P.C.—(Liq. Ferr. Perchlor. Fort.)—Strong Solution of Ferric Chloride. It contains from 58·5 to 61·5 per cent. w/v of $FeCl_3$, corresponding to about 20 per cent. of Fe.; it is four times the strength of Liquor Ferri Perchloridi, B.P.

This solution was included in the British Pharmacopœia, 1914.

Tinctura Ferri Perchloridi, B.P.C.—(Tinct. Ferr. Perchlor.)—Tincture of Ferric Chloride. It is of the same strength as solution of ferric chloride but contains 25 per cent. v/v of alcohol (90 per cent.). Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This tincture was included in the British Pharmacopœia, 1914.

FERRI PHOSPHAS
(Ferr. Phosph.)
Iron Phosphate

Iron phosphate may be obtained by the interaction of ferrous sulphate, sodium phosphate and sodium bicarbonate in aqueous solution. It consists of a mixture of hydrated ferrous phosphate and ferric phosphate, and some hydrated oxides of iron. It occurs as a slate-blue, amorphous powder, which is liable to darken in colour on exposure to air owing to oxidation and should be **stored** in well-closed containers.

Insoluble in water; readily soluble in hydrochloric acid.

Standard.—Iron phosphate, determined by the method of the British Pharmacopœia for Ferri Carbonas Saccharatus, contains not less than 47 per cent. of ferrous salts, calculated as ferrous phosphate, $Fe_3(PO_4)_2,8H_2O$; each millilitre of N/10 potassium dichromate is equivalent to 0·01672 gramme of $Fe_3(PO_4)_2,8H_2O$. Arsenic limit, 5 parts per million.

Action and Uses.—Iron phosphate is a mild ferruginous salt, with only slight astringent properties, and is used in rickets, the anæmias of children, tuberculous disease and neurasthenic conditions. It is **administered** in the form of Syrupus Ferri Phosphatis, Syrupus Ferri Phosphatis Compositus and Syrupus Ferri Phosphatis cum Quinina et Strychnina. Syrupus Ferri Phosphatis cum Quinina et Strychnina is incompatible with Syrupus Ferri Iodidi. Iron phosphate may also be dispensed in cachets, pills, or tablets.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Preparations

Liquor Ferri Phosphatis, B.P.C.—(Liq. Ferr. Phosph.)—Solution of Ferrous Phosphate. It contains iron equivalent to from 14·1 to 14·7 per cent. w/v of $Fe_3(PO_4)_2$. Dose.– 0·25 to 0·5 millilitre (4 to 8 minims).

Liquor Ferri Phosphatis Compositus, B.P.C.—(Liq. Ferr. Phosph. Co.)—Compound Solution of Ferrous Phosphate. It contains from 3·5 to 3·7 per cent. w/v of Fe, calculated as $Fe_3(PO_4)_2$, and from 5·4 to 5·8 per cent. w/v of calcium, calculated as $Ca_3(PO_4)_2$. When diluted with three times its volume of syrup it yields a compound syrup similar to that of the British Pharmacopœia. Dose.– 0·5 to 2 millilitres (8 to 30 minims).

Pilulæ Ferri Phosphatis cum Quinina et Strychnina, B.P.C.—(Pil. Ferr. Phosph. c. Quinin. et Strych.)—Iron Phosphate Pills with Quinine and Strychnine. *Syn.*—Pilulæ Trium Phosphatum; Easton's Pills; Pilulæ Ferri et Quininæ et Strychninæ Phosphatum. Each pill contains 1½ grains of saccharated iron phosphate, about ⅔ grain of quinine sulphate and $\frac{1}{120}$ grain of strychnine hydrochloride, and is approximately equivalent to ½ fluid drachm of syrup of ferrous phosphate with quinine and strychnine. Dose.– 1 or 2 pills.

Syrupus Ferri Phosphatis, B.P.C.—(Syr. Ferr. Phosph.)—Syrup of Ferrous Phosphate. It contains iron equivalent to from 1·7 to 1·9 per cent. w/v of $Fe_3(PO_4)_2$; 4 millilitres contains about 0·072 gramme, and 1 fluid drachm contains 1 grain, of anhydrous ferrous phosphate. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This syrup, prepared directly from iron, 0·86 per cent. w/v, phosphoric acid (specific gravity, 1·5), 6·25 per cent. w/v, syrup, 70 per cent. v/v, and distilled water, was included in the British Pharmacopœia, 1914.

Syrupus Ferri Phosphatis Compositus, B.P.—(Syr. Ferr. Phosph. Co.)—Compound Syrup of Ferrous Phosphate. *Syn.*—Parrish's Food; Parrish's Syrup; Chemical Food. It contains iron equivalent to 0·9 per cent. w/v of anhydrous ferrous phosphate, $Fe_3(PO_4)_2$ (limits, 0·85 to 0·95), and calcium equivalent to 1·4 per cent. w/v of tricalcium phosphate, $Ca_3(PO_4)_2$ (limits 1·3 to 1·5), with potassium and sodium phosphates, cochineal, sucrose, triple orange-flower water and distilled water. 8 millilitres contains the equivalent of about 0·7 gramme of anhydrous ferrous phosphate or about 0·034 gramme of iron, and the equivalent of about 0·11 gramme of tricalcium phosphate; 2 fluid drachms contains the equivalent of about 1½ grains of anhydrous ferrous phosphate or about ½ grain of iron, and the equivalent of about 1¾ grains of tricalcium phosphate. It should be stored in well-filled bottles. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

This syrup was included in the British Pharmaceutical Codex, 1923.

Syrupus Ferri Phosphatis cum Quinina et Strychnina, B.P.—(Syr. Ferr. Phosph. c. Quinin. et Strych.)—Syrup of Ferrous Phosphate with Quinine and Strychnine. *Syn.*—Easton's Syrup. It contains iron equivalent to 1·8 per cent. w/v of anhydrous ferrous phosphate, $Fe_3(PO_4)_2$ (limits, 1·62 to 1·98), 1·09 per cent. w/v of anhydrous quinine (limits, 1·04 to 1·2), and 0·0246 per cent. w/v of strychnine (limits, 0·022 to 0·027), with syrup, glycerin and distilled water. 4 millilitres contains the equivalent of 0·072 gramme of anhydrous ferrous phosphate or about 0·034 gramme of iron, about 0·059 gramme of quinine sulphate, and about 0·0012 gramme of strychnine hydrochloride; 1 fluid drachm contains the equivalent of about 1 grain of anhydrous ferrous phosphate or about ½ grain of iron, about ⅘ grain of quinine sulphate and about $\frac{1}{60}$ grain of strychnine hydrochloride. The proportion of strychnine is approximately one half the proportion of strychnine contained in the corresponding preparation of the British Pharmacopœia, 1914. It should be stored in completely-filled, well-closed containers and protected from light. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Syrupus Triplex, B.P.C.—(Syr. Trip.)—Triple Syrup. Equal parts of compound syrup of ferrous phosphate, compound syrup of hypophosphites and syrup of ferrous phosphate with quinine and strychnine. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tabellæ Ferri Phosphatis cum Quinina et Strychnina, B.P.C.—(Tab. Ferr. Phosph. c. Quinin. et Strych.)—Tablets of Ferrous Phosphate with Quinine and Strychnine. *Syn.*—Tabellæ Trium Phosphatum; Easton's Tablets; Tabellæ Eastonii; Tabellæ Ferri et Quininæ et Strychninæ Phosphatum. Each tablet contains about 2½ grains of saccharated iron phosphate, ⅘ grain of quinine sulphate and about $\frac{1}{60}$ grain of strychnine hydrochloride, and is approximately equivalent to 1 fluid drachm of syrup of ferrous phosphate with quinine and strychnine. Dose.– 1 tablet.

Tabellæ Phosphatum et Hypophosphitum Compositæ, B.P.C.—(Tab. Phosph. et Hypophosph. Co.)—Compound Tablets of Phosphates and Hypophosphites. *Syn.*—Triple Syrup Tablets. Each tablet contains saccharated iron phosphate, calcium, potassium and sodium phosphates, calcium, manganese, potassium and iron hypophosphites, strychnine and quinine sulphate, and is equivalent to 1 fluid drachm of a mixture of equal volumes of compound syrup of hypophosphites, compound syrup of ferrous phosphate and syrup of ferrous phosphate with quinine and strychnine. Dose.– 1 tablet.

FERRI PHOSPHAS SACCHARATUS

(Ferr. Phosph. Sacch.)

Saccharated Iron Phosphate

Saccharated iron phosphate is prepared by dissolving 20 parts of liquid glucose in 400 parts of boiling distilled water, and dissolving 120

parts of ferrous sulphate in the solution. Sodium phosphate, 110 parts, is then dissolved in 400 parts of boiling distilled water, to which the solution of ferrous sulphate is added, stirring constantly. A solution of sodium carbonate (50 parts in 400 parts of boiling distilled water) is then added and mixed thoroughly. The supernatant liquid is decanted, the precipitate washed with two successive quantities, each of 2000 parts of boiling distilled water, then mixed with 20 parts of liquid glucose, dried at a temperature not exceeding 100° and reduced to a fine powder. The product contains hydrated ferrous phosphate, with ferric phosphate and some iron oxide. It occurs as a slate-blue powder. It should be **stored** in well-closed containers.

Partly **soluble** in water; soluble in hydrochloric acid.

Standard.—Saccharated iron phosphate, determined by the method of the British Pharmacopœia for Ferri Carbonas Saccharatus, contains not less than 60 per cent. of ferrous salts, calculated as ferrous phosphate, $Fe_3(PO_4)_2,8H_2O$; each millilitre of N/10 potassium dichromate is equivalent to 0·01672 gramme of $Fe_3(PO_4)_2,8H_2O$. Arsenic limit, 5 parts per million.

Action and Uses.—Saccharated iron phosphate is mildly ferruginous with only slightly astringent properties, and is used in the treatment of rickets, the anæmias of children, tuberculous disease and neurasthenic conditions. It may be dispensed in cachets, pills, or tablets.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

FERRI PYROPHOSPHAS SOLUBILIS

(Ferr. Pyrophosph. Solub.)

Soluble Iron Pyrophosphate

Synonyms—Soluble Ferric Pyrophosphate; Sodio-citro-ferric Pyrophosphate.

Soluble iron pyrophosphate may be prepared by dissolving sodium pyrophosphate in a strong solution of an equal weight of ferric citrate, or by dissolving ferric pyrophosphate in a strong solution of sodium citrate, evaporating the solution, at a temperature not exceeding 60°, to a thick syrup, spreading on glass plates and scaling. It occurs in apple-green, transparent scales, becoming dark and discoloured on exposure to light, without odour, and having an acidulous, slightly saline taste. A solution of the salt produces no precipitate with potassium ferrocyanide solution, unless the solution is acidified. When 0·1 gramme is fused with 0·1 gramme each of potassium nitrate and sodium carbonate, and the residue boiled with 10 millilitres of water and filtered, the filtrate, after being nearly neutralised with dilute nitric acid, yields a yellow precipitate with silver nitrate solution. It should be **stored** in well-stoppered, amber-coloured bottles. Similar compounds containing

potassium or ammonium in place of all or part of the sodium are prepared and have similar properties.

Freely and completely **soluble** in water; insoluble in alcohol.

Standard.—Soluble iron pyrophosphate contains not less than 10 per cent. of Fe. The filtrate obtained by dissolving 1 gramme in 10 millilitres of water, boiling with sodium hydroxide solution and filtering, on acidifying with hydrochloric acid, cooling, adding magnesium ammonio-sulphate solution and excess of solution of ammonia, produces a precipitate which, when collected, does not turn yellow on the addition of a few drops of silver nitrate solution (limit of phosphate).

Assay.—Dissolve 1 gramme, accurately weighed, in 14 millilitres of water, add 6 millilitres of hydrochloric acid and boil for fifteen seconds; cool, add 3 grammes potassium iodide and titrate the liberated iodine with N/10 sodium thiosulphate; each millilitre of N/10 sodium thiosulphate is equivalent to 0·005584 gramme of Fe.

Action and Uses.—Iron pyrophosphate has the general properties of iron salts. It may be administered in mixture form or in cachets. Solutions in water are fairly permanent and may be mixed with solutions of the hypophosphites, with extract of malt, or with cod-liver oil emulsion. A sterilised solution is suitable for hypodermic use, the daily dose being from 0·06 to 0·12 gramme (1 to 2 grains).

Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

FERRI PYROPHOSPHAS.—Iron pyrophosphate, $Fe_4(P_2O_7)_3$, may be prepared by the interaction of sodium pyrophosphate and ferric sulphate, and occurs as a white powder. It is affected by light and should be stored in well-stoppered, amber-coloured bottles. Insoluble in water; slightly soluble in water containing carbon dioxide in solution and readily soluble in alkali citrates, forming green solutions. When iron pyrophosphate is prescribed, the soluble form (Ferri Pyrophosphas Solubilis) is always required. Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

Preparations

Extractum Malti Ferratum, B.P.C.—(Ext. Malt. Ferrat.)—Ferrated Extract of Malt. It contains 1·5 per cent. of soluble iron pyrophosphate in extract of malt. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Mistura Ferri cum Malto, B.P.C.—(Mist. Ferr. c. Malt.)—Mixture of Iron with Malt. Each fluid drachm contains 3 grains of soluble iron pyrophosphate in distilled water and liquid extract of malt. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

FERRI, QUININÆ ET STRYCHNINÆ CITRAS

(Ferr. Quinin. et Strych. Cit.)

Iron, Quinine and Strychnine Citrate

Iron, quinine and strychnine citrate may be prepared in the same manner as iron and quinine citrate, but with the addition of 1 per cent. of strychnine. It occurs in thin, transparent, deliquescent, greenish or

golden-yellow scales which are intensely bitter and mildly ferruginous in taste.

Soluble in water (1 in 2).

Standard.—Iron, quinine and strychnine citrate contains not less than 14·5 and not more than 15·5 per cent. of anhydrous quinine, not less than 0·95 and not more than 1·05 per cent. of strychnine and, when determined by the method of the British Pharmacopœia for Ferri et Quininæ Citras, not less than 12 and not more than 14 per cent. of Fe. Arsenic limit, 5 parts per million.

Assay.—For strychnine. Dissolve 2·5 grammes, weighed accurately, in 45 millilitres of water, add 10 millilitres of dilute solution of ammonia and completely extract the alkaloids by shaking with successive quantities of chloroform. Evaporate the chloroform, dry at 100°, weigh the residue of quinine and strychnine, and proceed by the British Pharmacopœia process for the determination of strychnine in Syrupus Ferri Phosphatis cum Quinina et Strychnina.

For quinine. Subtract the weight of the strychnine from the weight of the residue of quinine and strychnine.

Action and Uses.—Iron, quinine and strychnine citrate is used as a bitter ferruginous tonic in the same way as iron and quinine citrate. The two preparations are identical in appearance, and care should be taken in storing and distinguishing the strychnine compound. It may be **administered** in mixture form, in pills massed by means of alcohol, or in capsules.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

FERRI SULPHAS

(Ferr. Sulph.)

Ferrous Sulphate

$FeSO_4,7H_2O = 278·0$

Ferrous sulphate may be prepared by dissolving iron in dilute sulphuric acid and crystallising. If precipitated from a warm, concentrated, slightly acidified, aqueous solution by the addition of alcohol, it is obtained in a granular condition, in which form it is less prone to oxidation. It occurs as transparent, green crystals or as a pale, bluish-green, granular, crystalline powder, with an astringent, metallic taste. Ferrous sulphate loses six molecules of water at about 38°; at higher temperatures in air, basic sulphates are produced. It should be **stored** in well-closed containers. The names, green vitriol and green copperas, are sometimes used for crude ferrous sulphate.

Soluble in water (1 in 1·5); insoluble in alcohol (90 per cent.).

Standard, B.P.—Ferrous sulphate contains not less than 99 per cent. of $FeSO_4,7H_2O$. Arsenic limit, 2 parts per million. It complies

also with a limit test for absence of oxysulphate and with limit tests for copper, lead and acidity.

Action and Uses.—Iron compounds are particularly indicated in those forms of anæmia which are associated with a low colour index—the so-called microcytic hypochromic anæmias. These include simple achlorhydric anæmia, chlorosis, anæmia resulting from hæmorrhage, simple anæmia of pregnancy and the nutritional anæmia of infancy. The normal iron content of the body is about 3 grammes and, in health, the iron present in the food is absorbed in small quantities from the duodenum and in smaller quantities from the jejunum; it passes into the blood and to the liver, where it is built up with proteins to form a complex organic body which is liberated, as required, for the production of hæmoglobin. In anæmias due to loss of blood, recovery occurs without the exhibition of any drug, but iron accelerates the cure. Iron has a tonic action in all chronic cachectic conditions, such as malaria, syphilis and tuberculosis; that is, it tends to improve impaired activities of the body. In any condition in which deficiency of hæmoglobin exists, as in cardiac or renal disease, iron is also indicated. It is not so valuable in the treatment of pernicious anæmia, but is occasionally of great use when combined with arsenic.

It is generally agreed that the ferrous salts are the most satisfactory of the iron preparations for effecting hæmoglobin formation, and next in value are the scale preparations and reduced iron, which are capable of yielding ferrous ions in solution; ferric salts are relatively ineffective. It has been estimated that during the successful cure of anæmia of moderate severity, the quantity of hæmoglobin formed daily is equivalent to from 20 to 50 milligrams of metallic iron. In order to permit the absorption of this amount, the dose of the soluble salts should be equivalent to at least 100 milligrams of iron, and that of the insoluble salts ten times as much. Large doses of iron are therefore often necessary to produce a satisfactory cure of the anæmia, but there is evidence that ferrous sulphate is effective in doses of 20 grains daily. Pill of iron carbonate is often given in doses of 45 to 60 grains daily. Small doses of salts of copper or manganese are often prescribed with iron preparations on the assumption that they act as catalysts for the production of hæmoglobin. When intolerance is shown to iron given by the mouth, the drug may be injected intramuscularly; suitable preparations are the green iron and ammonium citrate and Injectio Ferri, but relatively large doses are necessary (see Ferri et Ammonii Citras Viridis). **Externally,** iron salts are powerfully astringent and styptic, the perchloride being most commonly employed for these properties.

Ferrous sulphate is **administered** in solution, often with magnesium sulphate, quinine sulphate and dilute sulphuric acid, as a tonic to promote appetite and improve the general condition, and in the treatment of amenorrhœa and anæmia. Its unpleasant taste is best covered with chloroform or peppermint water. In pill form, ferrous sulphate is often combined with arsenic, extract of nux vomica or extract of belladonna;

aloes is usually added to counteract the tendency to cause constipation. Large doses of ferrous sulphate, 200 grains daily, are sometimes given in pill form, the exsiccated salt being used. Large doses given in solution irritate the stomach and may have an emetic action. Iron preparations are administered on a full stomach. Dilute solutions of ferrous sulphate (0·5 to 1 per cent.) are used for astringent urethral and vaginal injections; an ointment (2 per cent.) has been used for hæmorrhoids.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

Preparations

Liquor Ferri Persulphatis, B.P.C.—(Liq. Ferr. Persulph.)—Solution of Ferric Sulphate. An aqueous solution of ferric sulphate containing the equivalent of from 14 to 15 per cent. w/v of Fe.

This solution was included in the British Pharmacopœia, 1914.

Mistura Ferri Composita, B.P.C.—(Mist. Ferr. Co.)—Compound Iron Mixture. *Syn.*—Griffith's Mixture. Each fluid ounce contains ferrous carbonate, equivalent to about 3 grains of ferrous sulphate, with potassium carbonate, myrrh, acacia, liquid glucose, spirit of nutmeg and rose water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This mixture was included in the British Pharmacopœia, 1914.

FERRI SULPHAS EXSICCATUS

(Ferr. Sulph. Exsic.)

Exsiccated Ferrous Sulphate

Exsiccated ferrous sulphate is ferrous sulphate from which part of the water of crystallisation has been removed by drying at 40°. It occurs as a greyish-white powder. It should be **stored** in well-closed containers.

It is slowly, but almost completely, **soluble** in freshly boiled and cooled water.

Standard, B.P.—Exsiccated ferrous sulphate contains not less than 80 per cent. of $FeSO_4$. Arsenic limit, 4 parts per million. It also complies with a test for solubility in acidified water.

Action and Uses.—Exsiccated ferrous sulphate is especially suitable for the preparation of pills which are intended to dissolve slowly in the stomach. Such pills are best made with syrup of liquid glucose, a rather soft mass being prepared quickly and cut into pills before hardening occurs. It may be given in doses of up to 9 grains or more daily.

Dose.– 0·03 to 0·2 gramme (½ to 3 grains).

Preparations

Pilula Aloes et Ferri, B.P.—(Pil. Aloes et Ferr.)—Pill of Aloes and Iron. Exsiccated ferrous sulphate, about 10 per cent., and aloes, about 20 per cent., with cinnamon, cardamom, ginger and syrup of liquid glucose. 0·5 gramme contains

about 0·05 gramme of exsiccated ferrous sulphate, corresponding to about 0·015 gramme of iron; 8 grains contains about $\frac{4}{5}$ grain of exsiccated ferrous sulphate, corresponding to about $\frac{1}{4}$ grain of iron. Dose.– 0·25 to 0·5 gramme (4 to 8 grains).

Pilula Ferri Carbonatis, B.P.—(Pil. Ferr. Carb.)—Pill of Iron Carbonate. *Syn.*—Blaud's Pill; Pilula Ferri; Iron Pill. It is prepared with exsiccated ferrous sulphate, exsiccated sodium carbonate, tragacanth, acacia, liquid glucose and water, and contains not less than 20 per cent. of ferrous iron, calculated as $FeCO_3$. 2 grammes contains about 0·2 gramme, and 30 grains about 3 grains of iron. Dose.– 0·3 to 2 grammes (5 to 30 grains).

Pilulæ Ferri Carbonatis Compositæ, B.P.C.—(Pil. Ferr. Carb. Co.)—Compound Iron Carbonate Pills. *Syn.*—Blaud's Pill with Aloin and Cascara. Each pill contains $\frac{1}{10}$ grain of aloin, $\frac{1}{2}$ grain of dry extract of cascara sagrada and 5 grains of pill of iron carbonate. Dose.– 1 to 3 pills.

Pilulæ Ferri Carbonatis cum Arseno et Strychnina, B.P.C.—(Pil. Ferr. Carb. c. Arsen. et Strych.)—Pills of Iron Carbonate with Arsenic and Strychnine. *Syn.*—Blaud's Pills with Arsenic and Strychnine. Each pill contains $\frac{1}{100}$ grain of arsenic trioxide, $\frac{1}{100}$ grain of strychnine hydrochloride and 5 grains of pill of iron carbonate. Dose.– 1 or 2 pills.

Pilulæ Ferri Carbonatis et Arseni, B.P.C.—(Pil. Ferr. Carb. et Arsen.)—Pills of Iron Carbonate and Arsenic. *Syn.*—Blaud's Pills with Arsenic. Each pill contains $\frac{1}{60}$ grain of arsenic trioxide and 5 grains of pill of iron carbonate. Dose.– 1 pill.

Pilulæ Ferri et Arseni, B.P.C.—(Pil. Ferr. et Arsen.)—Iron and Arsenic Pills. *Syn.*—Pilulæ Ferri Arsenicales. Each pill contains 3 grains of exsiccated ferrous sulphate and $\frac{1}{60}$ grain of arsenic trioxide. Dose.– 1 pill.

FERRI VALERIANAS

(Ferr. Valer.)

Iron Valerianate

Synonyms—Ferric Valerianate; Ferric Valerate.

Iron valerianate may be obtained by decomposing, in the cold, a solution of ferric sulphate or chloride with a solution of sodium valerianate, collecting the precipitate, washing with a little water, and drying at a temperature not exceeding 20°. It occurs as a dark red or brown, amorphous powder, having a slight odour and taste of valerianic acid.

Insoluble in water; entirely and readily soluble in alcohol; it is decomposed by boiling water, ferric oxide ultimately remaining.

Standard.—Iron valerianate yields on ignition not less than 24 per cent. of residue. Arsenic limit, 5 parts per million.

Action and Uses.—Iron valerianate, which combines the properties of the valerianates and iron, is given in hysterical conditions. It is prescribed in pills, usually with quinine and zinc valerianates, as in Pilulæ Ferri Valerianatis Compositæ.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

Preparation

Pilulæ Ferri Valerianatis Compositæ, B.P.C.—(Pil. Ferr. Valer. Co.)—Compound Iron Valerianate Pills. *Syn.*—Pilulæ Trium Valerianatum. Each pill contains 1 grain each of the valerianates of iron, quinine and zinc. Dose.– 1 or 2 pills.

FERRUM

(Ferr.)

Iron

Fe = 55·84

Iron is metallic iron in the form of fine, bright wire about 0·1 millimetre in diameter (No. 42 Standard Wire Gauge). It contains usually about 99·5 per cent. of Fe, with minute quantities of carbon, sulphur, silicon, phosphorus and arsenic, and has a specific gravity of 7·6 to 8·14.

Standard, B.P.—Arsenic limit, 200 parts per million.

Action and Uses.—The medicinal properties of preparations of iron are described under Ferri Sulphas. Iron wire is employed in the preparation of certain solutions, syrups and wines.

Preparations

Syrupus Ferri Bromidi, B.P.C.—(Syr. Ferr. Brom.)—Syrup of Ferrous Bromide. Each fluid drachm contains about 4½ grains of ferrous bromide. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Syrupus Ferri Bromidi cum Quinina, B.P.C.—(Syr. Ferr. Brom. c. Quinin.)—Syrup of Ferrous Bromide with Quinine. Quinine dihydrobromide, 2 per cent. w/v, with dilute hydrobromic acid and distilled water, in syrup of ferrous bromide; each fluid drachm contains about 1$\frac{1}{10}$ grains of quinine dihydrobromide and 4 grains of ferrous bromide. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Syrupus Ferri Bromidi cum Quinina et Strychnina, B.P.C.—(Syr. Ferr. Brom. c. Quinin. et Strych.)—Syrup of Ferrous Bromide with Quinine and Strychnine. Strychnine, about 0·03 per cent. w/v, and quinine dihydrobromide, 2 per cent. w/v, with dilute hydrobromic acid and distilled water in syrup of ferrous bromide; each fluid drachm contains about $\frac{1}{64}$ grain of strychnine, 1$\frac{1}{10}$ grains of quinine dihydrobromide and 4 grains of ferrous bromide. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Vinum Ferri, B.P.C.—(Vin. Ferr.)—Iron Wine. Sherry-type wine in which iron has been macerated until the liquid contains from 0·125 to 0·300 per cent. w/v of Fe. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

This wine, prepared with sherry, was included in the British Pharmacopœia, 1914.

FERRUM REDACTUM

(Ferr. Redact.)

Reduced Iron

Reduced iron is a mixture of metallic iron and ferric oxide, which

may be obtained by heating ferric oxide to dull redness in a porcelain or iron tube in a current of dry hydrogen until water vapour ceases to issue from the tube, which is allowed to cool slowly while hydrogen is still passed through it. Over-heating during manufacture produces a coarse preparation owing to agglomeration of the particles. Reduced iron occurs as a fine greyish-black powder, free from metallic lustre and gritty particles. It dissolves almost completely in dilute mineral acids, with evolution of hydrogen and formation of a solution of a ferrous salt, a slight residue of carbon and silicon usually remaining. Heated to redness in air, it glows strongly and is converted into ferroso-ferric oxide, Fe_3O_4. It should be **stored** in well-closed containers.

Insoluble in water and alcohol.

Standard, B.P.—Reduced iron contains not less than 80 per cent. of metallic iron. Arsenic limit, 200 parts per million.

Action and Uses.—Reduced iron is administered in the treatment of anæmia due to a deficiency of hæmoglobin. It is less suitable in cases associated with achlorhydria. It may be given in cachets, lozenges, or pills. Reduced iron is best made into pills by adding powdered liquorice and massing with syrup of liquid glucose or glycerin of tragacanth. Pills prepared with vegetable extracts, such as gentian, hyoscyamus and taraxacum, frequently split, owing to the evolution of hydrogen by reaction between the metallic iron and acids present in the extracts. Large doses, up to 2 grammes (½ drachm), are sometimes prescribed.

Dose.– 0·06 to 0·6 gramme (1 to 10 grains).

Preparation

Trochisci Ferri Redacti, B.P.C.—(Troch. Ferr. Redact.)—Reduced Iron Lozenges. Each lozenge contains 1 grain of reduced iron.

This lozenge, containing 0·06 *gramme of reduced iron, was included in the British Pharmacopœia,* 1914.

FICARIA
(Ficar.)
Pilewort

Synonym—Lesser Celandine.

Pilewort consists of the fresh herb, *Ranunculus Ficaria* Linn. (Fam. Ranunculaceæ), a common, spring-flowering, perennial herb, indigenous to Great Britain.

The stem is decumbent; the leaves are mostly radical, with stout petioles and cordate laminæ, and are glabrous with a crenate margin. The peduncles are stout, slightly longer than the radicle leaves, single-flowered and sometimes also bear one or two small leaves: the

flowers are bright yellow, glossy and about one inch in diameter, with eight to twelve petals and three sepals; at the base of each petal is a nectary covered with a small scale. The leaves are less acrid than those of other species of *Ranunculus* and after boiling are edible. Several of the roots enlarge to oblong club-shaped tubercles which are very acrid and bitter. Nothing definite is known about the constituents, but the fresh plant probably **contains** traces of an acrid principle resembling, or identical with, anemonin.

Action and Uses.—Pilewort is an old remedy for hæmorrhoids. It is used in the form of ointment and suppositories. The latter are prepared by melting together 4 parts of the ointment and 1 part of spermaceti, and dividing the mass into suppositories each weighing 4 or 6 grammes (1 to 1½ drachms).

Preparation

Unguentum Ficariæ, B.P.C.—(Ung. Ficar.)—Pilewort Ointment. Benzoinated lard in which pilewort, 30 per cent., has been digested.

FICUS
(Fic.)
Fig

Fig is the dried succulent syconus of *Ficus Carica* Linn. (Fam. Moraceæ), a tree indigenous to Western Asia and cultivated in most warm and temperate climates. When the fruits are ripe, they are collected and dried in the sun. The varieties are known in commerce as "natural," "pulled" or "pressed" figs. "Natural" figs are those which are packed loose and retain to some extent their original shape. "Pulled" figs have been kneaded and pulled to make them supple. "Pressed" figs have been closely packed in boxes so that they are compressed into discs.

The fig is a soft, fleshy, brown or yellowish fruit of irregular shape, up to about 5 centimetres in length and breadth; the outer part is tough and the large central hollow is lined by numerous drupels, each with a stone about 0·5 millimetre long. Externally, the fruit is sometimes covered with a saccharine efflorescence; at the summit is a small opening surrounded by bracts and at the base is a short, stalk-like portion. The odour is pleasantly fruity and the taste sweet.

Fig **contains** about 50 per cent. of sugar (principally invert sugar, but also some sucrose). Small quantities of citric, acetic and malic acids are also present.

Action and Uses.—Fig is nutritious and demulcent, and is used medicinally for its mildly laxative action, in the form of confections and syrups, usually with senna and carminatives.

Preparations

Syrupus Ficorum, B.P.C.—(Syr Fic.)—Syrup of Figs. A solution of sucrose in an aqueous decoction of fig. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Syrupus Ficorum Compositus, B.P.C.—(Syr. Fic. Co.)—Compound Syrup of Figs. *Syn.*—Syrupus Ficorum Aromaticus; Aromatic Syrup of Figs. Compound tincture of rhubarb, 1 in 20, liquid extract of senna, 1 in 10, and elixir of cascara sagrada, 1 in 20, in syrup of figs. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

FILIX MAS
(Filix Mas)
Male Fern

Synonym—Aspidium.

Male fern consists of the rhizome and frond-bases of *Dryopteris Filix-mas* (Linn.) Schott (Fam. Polypodiaceæ), a fern indigenous to Great Britain. It is collected late in the autumn, divested of its roots and dead portions and carefully dried, and is used within one year from the date of collection.

Male fern occurs in pieces from 7 to 15 centimetres or more in length and about 5 centimetres wide, oblique in direction and ending in a large bud showing circinate vernation. The rhizome proper is about 2 centimetres in diameter and is entirely covered with the hard, persistent, ascending, semi-cylindrical, dark brown bases of the fronds. Both rhizome and frond-bases, which show a phyllotaxis of 5 : 8, are densely covered with ramenta. The bases of the fronds are green internally, and the rhizome is yellowish-green. The transversely cut surface shows, both in each frond base and in the rhizome, a circle of about 7 to 9 pale yellowish, vascular strands of various sizes. Male fern has a slight odour and a taste which is at first sweetish and astringent, becoming later, bitter and nauseous.

The diagnostic **microscopical** characters are the abundant cellulose parenchyma of the ground tissue, filled with small starch grains up to 18 microns in diameter and showing intercellular spaces into which project shortly-stalked, pear-shaped, glandular trichomes; the yellowish-brown, fibrous sclerenchyma of the hypodermis; the large, lignified, prismatic, scalariform tracheids with pointed ends, from the xylem of the stele; the two-celled marginal teeth of the ramenta, which are devoid of glands except at the base, where there are usually two.

Male fern **contains** a yellow, amorphous substance of an acid nature, termed filmarone, to which the properties of male fern as a vermifuge are attributed. In solution, it slowly decomposes into filicic acid and aspidinol, both of which also occur preformed in the drug. Filicic acid is crystalline and melts at 213° to 215°; aspidinol crystallises in white needles melting at 143°, and is sparingly soluble in benzene and light

petroleum. Other constituents of the drug are albaspidin (melting-point, 148°), and flavaspidic acid which exists in two modifications, the α-form melting at 92° and the β-form melting at 156°; filicitannic acid is also present. Filicin is the name given to an amorphous modification of filicic acid, said to be an anhydride, as well as to the ether-soluble product obtained in the assay of the extract.

Substitutes.—The lady fern, *Athyrium Filixfœmina* Roth., and the shield fern, *Dryopteris spinulosa* O. Kuntze, occur occasionally as substitutes. The former is distinguished by the presence of only two large, dumb-bell shaped, vascular strands in each frond-base and by the absence of internal glandular trichomes in the parenchyma of the rhizome and frond-bases. The rhizome of *D. spinulosa* very closely resembles that of the male fern; it may be distinguished by the ramenta, which bear unicellular glandular trichomes on the margins. It contains albaspidin and yields an active extract.

Standard, B.P.—Male fern contains not more than 2 per cent. of foreign organic matter, and crystals of calcium oxalate are absent. Ash, not more than 6 per cent. Acid-insoluble ash, not more than 2 per cent.

Male fern, in powder (Pulvis Filicis : Pulv. Filic.), contains the constituents and possesses the diagnostic microscopical characters of Filix, and complies with the limits for ash and acid-insoluble ash of the unground drug.

Action and Uses.—Male fern is a tænicide and, although occasionally used in powder form, is generally employed as Extractum Filicis to expel tape-worm, to all varieties of which it is a direct poison. In very large doses it is a violent irritant, giving rise to acute gastro-enteritis. Cases are on record in which considerable absorption has taken place and blindness has followed. Extract of male fern is **administered** in mixture form or in capsules. It can be emulsified with one-sixth its volume of tincture of senega, an equal weight of powdered acacia, or half its weight of compound powder of tragacanth. The treatment is best commenced with 2 gramme (30 grain) doses of sodium bicarbonate, three or four times a day for seventy-two hours; the patient should have no solid food for two days, then from 16 to 24 grammes (4 to 6 drachms) of magnesium sulphate is given late at night; a few hours after purgation the extract should be given, followed in not less than four to five hours by a full dose of a saline purgative. Occasionally extract of male fern is used for removal of hook-worms. It is also used for the treatment of liver-fluke in sheep. In cases of **poisoning** by male fern, a mild saline purgative should be given, followed by demulcent drinks and stimulants; heat should be applied externally.

Dose.– 4 to 12 grammes (1 to 3 drachms).

Preparation

Extractum Filicis, B.P.—(Ext. Filic.)—Extract of Male Fern. *Syn.*—Extractum Filicis Liquidum; Liquid Extract of Male Fern; Oleoresina Aspidii. It is extracted with ether and adjusted, if necessary, with olive oil to contain 25 per cent. w/w of filicin (limits, 24 to 26). It should be stored in well-closed containers and thoroughly stirred before use. Dose.– 3 to 6 millilitres (¾ to 1½ fluid drachms).

FLUORESCEINUM SOLUBILE

(Fluoresc. Solub.)

Soluble Fluorescein

$C_{20}H_{10}O_5Na_2 = 376{\cdot}1$

Soluble fluorescein is the di-sodium salt of fluorescein, which is obtained by fusing phthalic anhydride and resorcinol at about 200° in the presence of a trace of sulphuric acid. The solid mass is purified by extraction with water, and the fluorescein obtained from the residue by dissolving in caustic alkali and precipitating the filtered solution with acid. Soluble fluorescein occurs as an odourless and almost tasteless orange-red powder. The aqueous solution is red when viewed by transmitted light; by reflected light it exhibits a strong green fluorescence which is visible in extreme dilutions. The fluorescence is destroyed by the addition of acid, but reappears when the solution is again made alkaline. Filter-paper which has absorbed a few drops of a 1 in 200 solution of soluble fluorescein is dyed yellow; if the paper is exposed to bromine vapour for one minute and then to the vapour of ammonia, the colour changes to a deep pink. Soluble fluorescein may be distinguished from acriflavine by the absence of a precipitate on the addition of sodium salicylate solution to a 1 in 500 solution.

Soluble in water (1 in 1), alcohol (90 per cent.) (1 in 5).

Standard, B.P.—Soluble fluorescein loses, on drying at 105°, not more than 5 per cent. of its weight. It complies also with limit tests for zinc, sulphate and chloride.

Action and Uses.—Soluble fluorescein is employed as a diagnostic agent in ophthalmic practice for delineating corneal lesions, etc., and for the detection of minute foreign bodies in the eye. Guttæ Fluoresceinæ is used for this purpose; the solution does not stain the normal cornea, but ulcers or parts deprived of epithelium become green, and foreign bodies appear surrounded by a green ring.

Soluble fluorescein in 2 to 5 per cent. solution, with the addition of 2 per cent. of sodium bicarbonate and 0·5 per cent. of glycerin, is used for external application as a spray over areas to be exposed to X-rays in the treatment of malignant disease. Solutions of similar strength, with or without added sodium bicarbonate, are used for intravenous injection in doses of 20 millilitres (300 minims), or doses of 1 to 3 grammes (15 to 45 grains) are given orally in the form of powders or in capsules. Solutions for **injection** may be sterilised by tyndallisation at 70° for one hour on three successive days.

EOSINUM.—Eosin (Colour Index No. 768) is the sodium or potassium salt of tetrabromofluorescein. It is a reddish-brown powder which is soluble in water forming a red liquid with a green fluorescence. Ethyl eosin, or eosin, spirit-soluble (Colour Index No. 770), is the potassium salt of the ethyl ester of tetrabromofluorescein. Eosin, blue-shade (Colour Index No. 771) is the potassium or sodium salt of dibromo-dinitrofluorescein. Eosin is used as a colouring agent for solution-tablets.

Preparation

Guttæ Fluoresceinæ, B.P.C.—(Gutt. Fluoresc.)—Fluorescein Eye Drops. *Syn.*—Liquor Fluoresceinæ. Soluble fluorescein, 2 per cent. w/v, in sterilised water.

FŒNICULUM

(Fœnic.)

Fennel

Synonyms—Fœniculi Fructus; Fennel Fruit.

Fennel consists of the dried, ripe fruits of cultivated plants of *Fœniculum vulgare* Mill. (Fam. Umbelliferæ). The plant is indigenous to the countries bordering the Mediterranean Sea, but is cultivated in the South of France, Saxony and Russia.

The fruits are up to about 10 millimetres long and 4 millimetres wide, and are usually entire cremocarps, with the pedicels attached. The cremocarp is oblong, laterally compressed, greenish-brown or yellowish-brown, glabrous and crowned by a short, bifid stylopod. Each mericarp has five prominent, yellowish, primary ridges and, when cut transversely, shows in the pericarp 2 commissural vittæ, and 4 dorsal vittæ which occur between the primary ridges, through each of which there runs a vascular strand. The small embryo is embedded in the upper end of the abundant oily endosperm, which is not grooved on the commissural surface. The odour is aromatic and the taste aromatic and camphoraceous.

The diagnostic **microscopical** characters are the epidermis of the pericarp, composed of quadrangular to polygonal cells with an unstriated cuticle; the lignified and reticulate parenchyma of the mesocarp; the polygonal, thick-walled cells of the endosperm, containing fixed oil, aleurone grains and minute rosettes of calcium oxalate; the inner epidermis of the pericarp with cells frequently showing a parquetry arrangement; the brown vittæ; the absence of starch.

Fennel **contains** from 3 to 4 per cent. of volatile oil. It yields to cold water from about 22 to 27 per cent. of extractive. The acid-insoluble ash is about 1·5 per cent.

Varieties.—Saxon fennel fruits are about 8 to 10 millimetres in length; they yield a volatile oil of which over 20 per cent. may consist of fenchone. Russian, Galician and Rumanian fennel closely resemble each other; they are usually shorter than the Saxon variety and yield a volatile oil containing a slightly smaller proportion of fenchone.

Substitutes.—The French sweet fennel, or Roman fennel, yields only about 2 per cent. of oil, which is practically free from fenchone. French fennel resembles the Saxon in appearance, but has a decidedly sweet anise odour. Japanese fennel is small (3 to 4 millimetres in length) and has an odour intermediate between that of the French and Saxon varieties; the oil contains about 10 per cent. of fenchone. Indian fennel is 6 to 7 millimetres long and has yielded 0·72 to 1 per cent. of oil containing 6·7 per cent. of fenchone. French bitter fennel is darker in colour, scurfy in the furrows and has less prominent ridges. Exhausted or partially exhausted fennel is deficient in oil and therefore deficient in odour; it may often be distinguished by its darker colour.

Standard, B.P.—Fennel contains not more than 2 per cent. of foreign organic matter. Ash, not more than 12 per cent.

Fennel, in powder (Pulvis Fœniculi : Pulv. Fœnic.), contains the constituents and possesses the diagnostic microscopical characters of Fœniculum, and complies with the limit for ash of the unground drug.

Action and Uses.—By virtue of the volatile oil which it contains, fennel has aromatic and carminative properties. It is a constituent of compound liquorice powder and is used in this and other powders to allay their tendency to gripe. Fennel water is sometimes mixed with sodium bicarbonate and syrup, and the mixture given to infants for the relief of flatulence.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Preparations

Aqua Fœniculi Concentrata, B.P.C.—(Aq. Fœnic. Conc.)—Concentrated Fennel Water. Oil of Fennel, 1 in 50. One part added to 39 parts of distilled water yields a preparation which is approximately equivalent in strength to distilled fennel water, but contains 1·5 per cent. v/v of alcohol (90 per cent.). Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Aqua Fœniculi Destillata, B.P.C.—(Aq. Fœnic. Dest.)—Distilled Fennel Water. Fennel, 1 in 10. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This water was included in the British Pharmacopœia, 1914, under the name of Aqua Fœniculi.

FŒNUM-GRÆCUM

(Fœnum-Græc.)

Fœnugreek

Fœnugreek consists of the seeds obtained from *Trigonella Fœnum-græcum* Linn. (Fam. Leguminosæ), an annual herb largely cultivated in India, Egypt and Morocco. The seeds are contained in long, narrow, sickle-shaped pods from which they are separated, when ripe, by threshing. Fœnugreek is exported chiefly from Mogadore and Bombay.

The seeds are rhomboidal in outline, brownish-yellow in colour, about 5 to 7 millimetres long and 2 millimetres thick. On one of the narrow sides is a depression in which both hilum and micropyle are situated, and from which a deep furrow runs diagonally, dividing the radicle pocket from the remainder of the seed. The endosperm is horny and translucent; it surrounds the radicle and two yellowish accumbent cotyledons, and swells considerably in water. The odour is characteristic and the taste disagreeable.

The diagnostic **microscopical** characters are the palisade epidermis of the seed coat, the cells of which are about 5 times as long as they are wide, conical at the upper extremity and rounded at the base; the hour-glass cells of the sub-epidermal layer, having bar-like thickenings on the radial walls, giving them a basket-like appearance; the polygonal

cells of the endosperm containing mucilage; the cells of the cotyledons containing aleurone grains and fixed oil.

Fœnugreek **contains** mucilage, about 28 per cent. (in the endosperm), fixed oil, about 6 per cent., and proteins, about 22 per cent. It also contains the bases, trigonelline and choline, and a flavone pigment.

Standard.—Fœnugreek contains not more than 2 per cent. of foreign organic matter. Ash, not more than 5 per cent. Cold water extractive, not less than 30 per cent.

Fœnugreek, in powder (Pulvis Fœnum-Græci : Pulv. Fœnum-Græc.), contains the constituents and possesses the diagnostic microscopical characters of Fœnum-Græcum, and complies with the limits for ash and cold water extractive of the unground drug.

Action and Uses.—Fœnugreek is used in veterinary medicine, and occasionally in curry powders.

FORMAMOL
(Formam.)
Formamol

Synonym—Hexamethylenetetramine Anhydromethylenecitrate.

Formamol may be prepared by combining anhydromethylenecitric acid with hexamine. It occurs in the form of colourless crystals, or as a white, crystalline powder, having an acid taste. It is slowly decomposed by dilute acids, and more readily by alkalis, with liberation of formaldehyde.

Soluble in water (1 in 5); sparingly soluble in alcohol; nearly insoluble in ether.

Action and Uses.—Formamol is given in infections of the genito-urinary tract and gall-bladder. It acts in the same way as hexamine. It is best administered with acetates and citrates, and may be given in cachets or tablets, which should be swallowed with a large draught of water.

Dose.– 0·5 to 1 gramme (8 to 15 grains).

FRANGULA
(Frang.)
Frangula

Synonyms—Alder Buckthorn Bark; Frangula Bark.

Frangula consists of the bark of the stem and branches of *Rhamnus Frangula* Linn. (Fam. Rhamnaceæ), a shrub widely distributed over

Europe. It is collected in the spring, and should mature for at least a year before being employed medicinally.

The bark varies considerably in appearance, according to the age of the branch or stem from which it has been taken. Young bark, which is to be preferred, occurs in single or double quills about 1 centimetre wide and of papery texture, with an outer surface of smooth, dark-purplish cork, bearing numerous transversely-elongated, whitish lenticels; when gently scraped, the crimson colour of the inner layers becomes evident. The inner surface is brown, finely striated longitudinally, and the fracture is short in the cork and cortex, and fibrous in the phloem. Older bark is rougher externally, thicker, and usually occurs in single quills or channelled pieces. The smoothed, transverse surface shows a narrow, crimson or purple cork and a yellowish-brown cortex and phloem. The colour of the powder is changed from greenish-yellow to a deep purple-red by solution of caustic potash. The bark is odourless, but has a sweetish or slightly bitter taste. **Microscopically,** the cells of the cork contain purplish-red contents; in the cortex are large cells filled with mucilage; in the phloem are numerous medullary rays 1 to 2 cells wide, and tangential groups of fibres, with prismatic crystals of calcium oxalate in files of cells forming a crystal sheath around each group; throughout are rosette-crystals of calcium oxalate and a few very small starch grains. Stone cells are absent.

Frangula **contains** the crystalline glycoside, frangulin, which on hydrolysis gives rhamnose and frangula-emodin (1 : 6 : 8-trihydroxy-3-methylanthraquinone).

Substitutes.—The bark of *R. saxatilis* Jacq. contains a dull red, instead of crimson, colouring matter in the cork and has sclerenchymatous cells in the outer bark. The bark of *Alnus glutinosa* Medic. also exhibits sclerenchymatous cells.

Standard.—Frangula contains not more than 2 per cent. of foreign organic matter.

Action and Uses.—Frangula bark has properties similar to those of cascara sagrada. It is used as a mild purgative, principally in the form of a liquid extract.

FUCUS

(Fucus)

Bladderwrack

Synonyms—Seawrack; Kelpware.

Bladderwrack is the dried plant, *Fucus vesiculosus* Linn. (Fam. Fucaceæ), a seaweed very common on the coast of Great Britain. For medicinal use the plant is freshly gathered from the rocks on which it grows, and dried.

The drug consists of the nearly black, thin, flattened, branching thallus, which is about 18 millimetres wide and sometimes as much as 1 metre in

length. When quite dry it is hard and brittle, and becomes softer and cartilaginous when moist. It has an entire margin and bears air vesicles in pairs. Some of the branches terminate in thickened enlargements, in which the reproductive organs are situated. The odour is characteristic of seaweed, and the taste is saline, mucilaginous and mawkish.

Bladderwrack **contains** a gelatinous substance, algin, and mannitol. A small variable amount of iodine is present, which is said to exist in the seaweed in the form of an organic compound.

Substitutes.—*Fucus serratus* Linn. is also commonly found on the seashore; it may be distinguished from bladderwrack by its serrated margin and the absence of air vesicles. *Ascophyllum nodosum* (Linn.) le Jol. has single vesicles.

Action and Uses.—Bladderwrack, by virtue of its iodine content, influences the activity of the thyroid gland. It has been used to reduce certain types of obesity. Bladderwrack is **administered** in the form of Extractum Fuci and Extractum Fuci Liquidum. The solid extract is suitable for the preparation of pills; the liquid extract is used in mixture form, generally with alkali iodides and sometimes in combination with liquid extract of thyroid. A decoction of the fresh plant has been used **externally** as a liniment for joint affections.

Preparations

Extractum Fuci, B.P.C.—(Ext. Fuci)—Extract of Bladderwrack. A soft extract. Dose.– 0·2 to 0 6 gramme (3 to 10 grains).

Extractum Fuci Liquidum, B.P.C.—(Ext. Fuci Liq.)—Liquid Extract of Bladderwrack. 1 in 1. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

GALANGA
(Galang.)

Galangal

Synonyms—East Indian Root; Lesser Galangal.

Galangal consists of the dried rhizome of *Alpinia officinarum* Hance (Fam. Zingiberaceæ), cultivated in the South-East of China and on the neighbouring island of Hainan, to which it is indigenous.

The rhizome occurs in hard, branching, nearly cylindrical pieces varying from 4 to 8 centimetres in length and from 10 to 20 millimetres in thickness, and of a reddish-brown colour. It is marked with the fine, light yellow annuli of the leaf-bases, which encircle it at intervals of from 3 to 10 millimetres. The fracture is hard and fibrous. The smoothed, transverse section is generally paler than the exterior and exhibits a stele, which occupies about one-third of the total diameter. In both cortex and stele, numerous, scattered, deep red, resin cells occur. The taste is pungent and spicy, and the odour is agreeable, recalling that of ginger.

Galangal **contains** from about 0·5 to 1·5 per cent. of volatile oil, to

which the aroma is due, a pungent oily body, galangol, and three tasteless, yellow, crystalline bodies, namely, kæmpferide (1:3-dihydroxy-4-methoxyflavanol), galangin and the monomethylether of galangin (dihydroxyflavanol). The drug yields to alcohol (90 per cent.) about 10 per cent. of extractive.

Substitutes.—The rhizome of *Alpinia Galanga* Willd., greater galangal, should not be confused with that of *A. officinarum*. The former is occasionally imported from Java and may be distinguished by its larger size, orange-brown cork and pale buff interior.

Standard.—Galangal contains not more than 2 per cent. of foreign organic matter. Acid-insoluble ash, not more than 3 per cent.

Galangal, in powder (Pulvis Galangæ : Pulv. Galang.), contains the constituents of Galanga, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Galangal is aromatic and carminative. It is used in the form of infusion or decoction (1 in 20) for flatulence and dyspepsia.

Dose.– 1 to 2 grammes ($\frac{1}{4}$ to $\frac{1}{2}$ drachm).

GALBANUM
(Galban.)

Galbanum

Galbanum is a gum-resin obtained from *Ferula galbaniflua* Boiss. and Buhse (Fam. Umbelliferæ), and probably other species of *Ferula*, indigenous to Persia. A portion of the drug appears to be collected from the natural exudation of the stem, but the larger part is obtained by cutting off the stem at the base of the plant, allowing the exudate to harden and removing successive slices of the root at intervals.

Galbanum occurs in distinct tears, in small masses of agglutinated tears, or in lump form. The tears are rounded or irregular in shape, usually from 5 to 10 millimetres in diameter, yellowish-brown or orange-brown externally, with a rough and often dirty surface. The fracture is granular, the exposed surface being pale yellowish in colour and opaque, though sometimes translucent and bluish-green. The tears are readily softened by pressure between the finger and thumb. The odour is characteristic and not unpleasantly aromatic, but the taste is bitter and rather disagreeable. Lump galbanum consists of yellowish, bluish-green or brownish tears embedded in a brownish mass mixed with slices of the root and some foreign matter. When 0·2 gramme of galbanum is powdered with 2 grammes of sand, the mixture boiled with 5 millilitres of alcohol (90 per cent.) for one or two minutes and the cooled, filtered tincture added to 5 millilitres of alcohol (90 per cent.) mixed with 0·5 millilitre of solution of ammonia, a blue fluorescence is produced (presence of free umbelliferone).

Galbanum **contains** a volatile oil (about 5 to 20 per cent.), resin

(about 50 to 70 per cent.), gum (about 20 per cent.), moisture (from 1 to 10 per cent.) and mineral matter. The resin consists of umbelliferone combined with galbaresinotannol, together with traces of free umbelliferone. The volatile oil contains α- and β-pinene, myrcene, a ketone, $C_{10}H_{16}O$, cadinene and cadinol. The drug yields about 40 per cent. of substances insoluble in alcohol (90 per cent.).

Varieties—Levant galbanum yields a volatile oil which is lævorotatory. Persian galbanum is softer than the Levant variety, and contains the fruits and portions of the stalks of the plant; it has a more terebinthinate odour and yields a volatile oil which is dextrorotatory.

Standard.—Galbanum yields not more than 7 per cent. of ash.

Action and Uses.—Galbanum is employed as a stimulant expectorant in chronic bronchitis. It has been used externally in the form of plaster (Emplastrum Galbani) for inflammatory swellings. On account of its disagreeable taste and odour galbanum is administered in pill form, generally with asafetida, as Pilulæ Galbani Compositæ, a combination which is prescribed in some hysterical conditions.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparation

Pilulæ Galbani Compositæ, B.P.C.—(Pil. Galban. Co.)—Compound Pills of Galbanum. *Syn.*—Compound Pills of Asafetida. Each pill contains 1 grain each of asafetida, galbanum and myrrh. Dose.– 1 or 2 pills.

GALLA
(Gall.)
Gall

Synonyms—Galls; Nutgall; Aleppo Galls; Blue Galls; Gallæ Ceruleæ.

Gall consists of the excrescences on the twigs of *Quercus infectoria* Olivier (Fam. Fagaceæ) resulting from the stimulus given to the tissues of the young twig by the deposition of an egg of the gall-wasp, *Cynips gallæ tinctoriæ* Olivier (Fam. Cynipidæ). It is collected in Asiatic Turkey and brought to Aleppo, and is known in commerce as Aleppo, Turkey, or Levant galls.

The excrescences are nearly spherical, 12 to 18 millimetres in diameter and dark bluish-green or olive-green in colour; near the base they are smooth, but the upper portion is tuberculated. They are hard and heavy and sink in water; they gradually absorb water, becoming enlarged and softened. Internally, they are brownish-white and show a central cavity, which is surrounded by a hard layer and contains a larva or pupa of *Cynips gallæ tinctoriæ*. In some galls a channel is bored from the central cavity almost to the external surface, and in it may be a young imago. The drug is odourless and the taste astringent and subsequently somewhat sweet.

The diagnostic **microscopical** characters are the fairly numerous sclerenchymatous cells from the region surrounding the central cavity;

the lignin bodies and scanty starch grains from the region within the sclerenchyma; the abundant, thick-walled and pitted parenchyma, containing numerous flakes of tannin and both cluster and prismatic crystals of calcium oxalate; the presence of only a few small vessels.

Gall **contains** gallotannic acid, about 50 to 70 per cent. Small quantities of gallic acid (2 to 4 per cent.), ellagic acid, sugar, starch, inorganic matter (about 2 per cent.), moisture (about 10 per cent.), and a monobasic hydroxycarboxylic acid termed cyclogallipharic acid are also present.

Substitutes and Adulterants.—"White" galls are brownish or yellowish-brown externally and show a small, circular perforation from which the insect has escaped; they are somewhat lighter and are less esteemed than "blue" galls, although the content of gallotannic acid is about the same. English galls formed on *Quercus Robur* Linn. by *Cynips Kollari* are brown, smooth, globular and usually perforated; they float on water, in which they do not become softened or swollen; they contain about 15 to 20 per cent. of gallotannic acid. Chinese or Japanese galls are formed by *Aphis chinensis* Bell on *Rhus semialata* Murray (Fam. Anacardiaceæ) and contain about 70 per cent. of gallotannic acid. They are irregularly formed with large, conical projections, being from 3 to 7 centimetres long; they have a covering of thick, grey, velvety down, which masks their reddish-brown colour.

Action and Uses.—Gall is powerfully astringent owing to the large proportion of gallotannic acid it contains. Preparations of gall are usually applied externally, although Tinctura Gallæ is occasionally administered internally as an astringent. Unguentum Gallæ and Unguentum Gallæ cum Opio, are valuable astringents for use in painful hæmorrhoids. For similar use, suppositories are prepared containing 0·3 gramme (5 grains) of powdered gall, with or without 0·06 gramme (1 grain) of powdered opium, or 0·03 gramme (½ grain) of cocaine. Preparations of gall are **incompatible** with the salts of iron, lead, copper and silver.

Dose.– 0·6 to 1·2 grammes (10 to 20 grains).

Preparations

Tinctura Gallæ, B.P.C.—(Tinct. Gall.)—Tincture of Gall. 1 in 8. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Unguentum Gallæ, B.P.C.—(Ung. Gall.)—Gall Ointment. Gall, 20 per cent., in benzoinated lard.

This ointment was included in the British Pharmacopœia, 1914.

Unguentum Gallæ cum Opio, B.P.C.—(Ung. Gall. c. Opio)—Gall and Opium Ointment. *Syn.*—Unguentum Gallæ Compositum. Powdered opium, 7·5 per cent., in gall ointment.

This ointment was included in the British Pharmacopœia, 1914.

GELATINUM
(Gelat.)
Gelatin

Gelatin is obtained by boiling animal tissues, such as skin, tendons, ligaments and bones, with water, skimming and straining the resulting

liquid, evaporating the solution at a low temperature and drying by exposure to the air. The crude gelatin thus obtained is highly coloured and odorous and is subjected to a process of purification. Gelatin does not pre-exist as such in the animal tissues, but is formed by the prolonged action of boiling water on collagen, which is the substance of which the white fibres of connective tissues are composed and is probably an anhydride of gelatin.

Gelatin occurs in colourless or pale yellowish, translucent sheets or shreds, with only a slight odour and taste. It is permanent in air when dry, but putrefies rapidly when moist or in solution. Gelatin which has been softened by immersion in cold water dissolves when the water is heated, forming a viscous liquid which sets to a jelly on cooling. This property is much less marked after prolonged heating of the solution and is quickly destroyed by heating to 140° in sealed tubes, the gelatin being altered to gelatose, paragelatose, or gelatones. The gelatinising power of different samples varies considerably, and it is, therefore, often desirable to use the same brand of gelatin for the same preparation. A very pure gelatin may be prepared by soaking the best grade of the commercial substance for several days in successive quantities of water, by which treatment saline and other soluble bodies are removed. The gelatin is then dissolved in hot water and filtered while hot into alcohol. The white, thready masses thus precipitated are re-dissolved in hot water, the precipitation in alcohol repeated and the product subsequently dried. Thus prepared, gelatin yields only about 0·6 per cent. of ash.

The solubility of gelatin in acetic acid distinguishes it from chondrin, a mixture of glutin and mucinoid substances obtained from hyaline cartilage by boiling with water and precipitating from the aqueous solution with acetic acid. An aqueous solution of gelatin yields no precipitate with acids, except tannic acid, is not affected by lead acetate, ferric chloride, nor by the majority of metallic salts which precipitate the proteins, but is precipitated by chlorine water or bromine water, mercuric chloride, platinic chloride and trinitrophenol. It is completely precipitated by saturation with ammonium sulphate, magnesium sulphate or zinc sulphate. When potassium dichromate is added to the hot aqueous solution, the jelly which forms on cooling becomes insoluble in warm water after exposure to light; formaldehyde renders gelatin hard and insoluble after drying. When used as an article of food, gelatin must contain not more than 2 parts of arsenic and 20 parts of lead per million and must be free from copper and zinc.

Soluble in hot water, a cold mixture of glycerin and water and acetic acid; insoluble in alcohol (90 per cent.), ether and chloroform.

Standard, B.P.—Gelatin in 2 per cent. w/v hot aqueous solution is odourless and sets to a transparent or translucent jelly on cooling. Ash, not more than 2 per cent. Sulphur dioxide limit, 1000 parts per million. It complies also with a test for limit of acidity.

Action and Uses.—Gelatin has been used as a nutrient, but its value for this purpose has been much exaggerated. Experiment has shown, however, that it is well utilised as a protein when given in conjunction with milk proteins. Gelatin is used internally, chiefly as a hæmostatic. Injected hypodermically, 1 or 2 per cent. w/v in physiological sodium chloride solution, it has been used to promote the formation of clot in aneurisms and to arrest hæmorrhage from the lungs or kidneys. Stronger solutions (5 per cent.) have been used by rectal injection for purpura and hæmoptysis. Solutions for **injection** may be prepared by dissolving the washed gelatin in sterilised distilled water, after which they should be sterilised by heating in an autoclave at 120° for thirty minutes, care being taken to ensure that the whole of the solution is maintained at that temperature for thirty minutes. Solutions of gelatin for rectal, subcutaneous, or local use must be sterilised with the most rigorous care, since tetanus has in some instances arisen from their use, and some specimens of gelatin contain tetanus spores.

Gelatin is largely used as a demulcent and emollient in the preparation of pastilles for the local application of medicaments to the throat. A similar basis containing a smaller proportion of gelatin is used in the preparation of pessaries and urethral bougies and to solidify glycerin for use as a suppository. A gelatin-glycerin basis is also used for the preparation of nasal bougies (see Buginaria). Tannin, owing to the facility with which it combines with gelatin, is better prescribed with oil of theobroma in bougies, suppositories and pessaries. Pastes of gelatin with glycerin, of the type of Unna's paste, are prepared containing zinc oxide, resorcinol, or other medicaments. Gelatin is used in the preparation of culture media for use in bacteriology; certain bacteria have the power of liquefying the jelly.

Gelatin capsules afford a suitable means of administering many disagreeable substances in a convenient and readily soluble form. When solution is required to take place only in the intestine, the capsules may be coated with keratin or dipped in solution of formaldehyde. Sinclair's glue is an adhesive preparation made by dissolving 50 parts of glue, 2 parts of glycerin, 2 parts of calcium chloride and 1 part of thymol in 50 parts of water. It is used in place of adhesive plaster for affixing extension apparatus to limbs in cases of fracture or joint disease. The preparation is melted on the water-bath and painted on the skin, the extension straps are pressed firmly in while the glue is still soft, and a bandage is then applied. Sinclair's glue gives more secure fixation than adhesive plaster, especially if the patient is febrile. Further, it can be used in cases where adhesive plaster is ineffective, as, for instance, for fixing extension apparatus directly to the sole of the foot.

Preparation

Glycogelatinum, B.P.C.—(Glycogel.)—Glycogelatin. Gelatin, 1 in 5, with sucrose, citric acid and flavouring agents.

GELSEMINA
(Gelsemin.)
Gelsemine

$C_{20}H_{22}O_2N_2 = 322{\cdot}2$

Gelsemine is an alkaloid obtained from gelsemium. It occurs in white, microscopic crystals. It has a strongly alkaline reaction and is dextrorotatory in chloroform solution. With concentrated sulphuric acid it gives a yellowish, and with concentrated nitric acid, a green colouration. Sulphuric acid with an oxidising agent gives a violet colouration, which becomes green after some time. The pure alkaloid melts at 178°.

Soluble with difficulty in water, more easily in alcohol, very easily soluble in ether and chloroform.

Action and Uses.—Gelsemine has the same action as gelsemium. Applied to the eye, it produces dilatation of the pupil, lasting about two days, and causes some irritation. Its use as a mydriatic has been abandoned. It is used in the treatment of trigeminal neuralgia and is **administered** in pills, frequently in combination with butylchloral hydrate. In cases of **poisoning** the antidotes described under Gelsemium should be employed.

Dose.– 0·0005 to 0·002 gramme ($\frac{1}{120}$ to $\frac{1}{30}$ grain).

GELSEMINÆ HYDROCHLORIDUM. — Gelsemine hydrochloride, $C_{20}H_{22}O_2N_2$, HCl, occurs in the form of prismatic crystals or as a white crystalline powder. It is soluble in water, but not readily soluble in alcohol. Dose.– 0·0005 to 0·002 gramme ($\frac{1}{120}$ to $\frac{1}{30}$ grain).

GELSEMIUM
(Gelsem.)
Gelsemium

Synonyms—Gelsemii Radix; Yellow Jasmine Root.

Gelsemium consists of the dried rhizome and roots of *Gelsemium sempervirens* Ait. (Fam. Loganiaceæ), a climbing plant indigenous to the Southern United States, and obtained chiefly from Virginia, North and South Carolina, and Tennessee.

The rhizome usually occurs in straight, almost cylindrical pieces, 5 to 20 centimetres in length and 3 to 30 millimetres in thickness. Attached to the rhizome are frequently small fibrous or large roots and sometimes small portions of the slender aerial stems of a dark purplish colour. The rhizome externally is light yellowish-brown, longitudinally wrinkled, with purple, reticulated lines on the older pieces; internally, it is light brown or pale yellow. The drug is tough and the fracture

splintery. The smoothed, transverse surface exhibits a conspicuously radiate structure, narrow, yellowish xylem wedges with small vessels alternating with straight, whitish medullary rays. The centre of the rhizome is usually occupied by a small, disintegrated pith. The root closely resembles the rhizome, but is somewhat tortuous and of a uniform, light brown colour. The scraped or broken surface exhibits a marked blue fluorescence when exposed to ultra-violet light. The taste is slightly bitter and the odour faintly aromatic.

The diagnostic **microscopical** characters are the thin-walled cork cells; the small amount of cortical parenchyma, containing spheroidal starch grains up to 8 microns in diameter; the prisms of calcium oxalate, up to 30 microns long, found in the medullary rays of the phloem; the abundant xylem elements; the lignified cells of the xylem medullary rays, containing small starch grains; the occasional pericyclic fibres from the pieces of aerial stem.

Gelsemium **contains** the crystalline alkaloid, gelsemine, and the amorphous mixture of alkaloids usually called gelseminine. The latter has much the greater physiological activity. There are also present scopoletin (gelsemic acid) and pentatriacontane, emodinmonomethyl ether, ipuranol and a mixture of fatty acids. Gelsemium yields to alcohol (60 per cent.) about 16 per cent. of extractive.

Standard.—Gelsemium contains not more than 2 per cent. of foreign organic matter

Action and Uses.—Gelsemium paralyses the nerve centres first, and the motor nerve endings only after very large doses have been given. It should be used with care, since untoward symptoms sometimes result from comparatively small doses. Excessive doses cause giddiness, double vision, and loss of power, with slowing and subsequent cessation of respiration. Gelsemium is employed in migraine and neuralgia, especially neuralgia of the fifth nerve, and also in rheumatism and in ovarian and uterine pain. It is **administered** in the form of tincture, which may be given in mixture form with the bromides or with butyl-chloral hydrate. Extract of gelsemium is prescribed in pills, frequently with butylchloral hydrate. In cases of **poisoning** by gelsemium or its alkaloids, the stomach pump should be used or an emetic given, followed by a hypodermic injection of atropine and administration of stimulants, artificial respiration being employed if necessary.

Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

Preparations

Extractum Gelsemii, B.P.C.—(Ext. Gelsem.)—Extract of Gelsemium. A soft extract. Dose.– 0·03 to 0·12 gramme ($\frac{1}{2}$ to 2 grains).

Tinctura Gelsemii B.P.C.—(Tinct. Gelsem.)—Tincture of Gelsemium, 1 in 10. Dose.– 0·3 to 1 millilitre (5 to 15 minims)

This tincture was included in the British Pharmacopœia, 1914.

GENTIANA
(Gentian.)
Gentian

Synonyms—Gentianæ Radix; Gentian Root.

Gentian consists of the dried rhizome and root of *Gentiana lutea* Linn. (Fam. Gentianaceæ), a herbaceous perennial indigenous to Central Europe and Spain, and imported chiefly from Marseilles. The rhizome and root are collected in the autumn and dried. The fresh rhizome and root is yellowish-white internally, but becomes darker by slow drying, during which the characteristic odour of the drug is developed.

Gentian occurs in sub-cylindrical pieces, which may be entire or split longitudinally and may vary in length from about 15 to 20 or more centimetres and in thickness up to about 2·5 centimetres, occasionally reaching as much as 4 to 8 centimetres at the crown. The outer surface of both rhizome and root is yellowish-brown to dark brown; the root is longitudinally wrinkled and the rhizome, which is occasionally branched, frequently terminates in a bud and bears numerous, encircling leaf-scars, which appear as transverse annulations. When moist the drug is tough and flexible, but when dry it is brittle and breaks with a short fracture; the smoothed, transverse surface is reddish-yellow and shows a well-marked, dark cambium ring, separating a somewhat wide bark from a large parenchymatous xylem which shows no distinctly radiate structure. The odour is characteristic and the taste at first sweet and afterwards intensely bitter.

The diagnostic **microscopical** characters are the abundant, somewhat thick-walled parenchyma, containing small globules of oil and sometimes groups of minute needles of calcium oxalate, about 3 to 6 microns in length; small numbers of reticulate, annular and spiral vessels; groups of yellowish-brown cork cells; occasional small starch grains; the absence of stone cells and fibres.

Gentian **contains** the bitter principles, gentiin and gentiamarin. Gentiin is crystalline and glycosidal; gentiamarin is amorphous. In addition to these substances, gentian root also contains a yellow, crystalline phenol (gentisin or gentianic acid), and the trisaccharide, gentianose, together with pectin and oil.

Substitutes.—The roots of various other species of *Gentiana* are found in commerce. The most important are *G. purpurea* Linn. from Switzerland, *G. pannonica* Scop. from Austria and *G. punctata* Linn. from Austria. These are all smaller than the root of *G. lutea*, the root of *G. purpurea*, which most nearly resembles it, attaining only about half the size; the crown of this root has a peculiar, branched appearance due to the presence of the bases of several aerial stems covered below with scaly leaves. White gentian of Continental commerce is derived from *Laserpitium latifolium* Linn., that of English commerce possibly from *G. Burseri* Lapeyr. Highly fermented gentian root may yield to cold water as little as 13 per cent. of extractive.

Standard, B.P.—Gentian contains not more than 2 per cent. of

foreign organic matter. Water-soluble extractive, not less than 33 per cent. Ash, not more than 6 per cent.

Gentian, in powder (Pulvis Gentianæ : Pulv. Gentian.), contains the constituents and possesses the diagnostic microscopical characters of Gentiana, and complies with the limits for water-soluble extractive and ash of the unground drug.

Action and Uses.—Gentian is a bitter and is used to improve the appetite and to stimulate gastric secretion, which it does reflexly through the sense of taste, and is therefore most effective if given shortly before meals. It is usually **administered** in the form of infusion, compound infusion, or compound tincture. The compound infusion is a suitable vehicle for alkaline or acid digestive tonics.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

AZADIRACHTA.—Indian azadirach, neem bark, or margosa bark, is the dried stem bark of *Melia Azadirachta* Linn. (Fam. Meliaceæ), a tree indigenous to India, Ceylon and the Malay Archipelago. The bark occurs in channelled, tough, fibrous pieces, attaining to as much as 10 millimetres in thickness. Externally, it has a brownish-grey colour, and a rough, scaly or fissured surface. Internally, it is yellowish, conspicuously laminated, and coarsely fibrous. The smoothed, transverse surface is minutely chequered; pale, narrow medullary rays and tangential bands of parenchyma alternate with darker groups of bast fibres. Under the microscope, the latter are seen to be surrounded by lignified parenchymatous cells. Indian azadirach contains a bitter, amorphous resin, a crystalline, bitter alkaloid (margosine), margosic acid, a crystalline substance, and tannin. It is employed in India and the Eastern Colonies as an equivalent of gentian or quassia and is administered usually in the form of tincture or infusion.

Preparations

Extractum Gentianæ, B.P.—(Ext. Gent.)—Extract of Gentian. A soft aqueous extract. Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

Infusum Gentianæ Compositum Concentratum, B.P.—(Inf. Gent. Co. Conc.)—Concentrated Compound Infusion of Gentian. Gentian and dried bitter-orange peel, about 1 in 10, and lemon peel, about 1 in 5, extracted with alcohol (25 per cent.). This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh compound infusion of gentian and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

A concentrated infusion, prepared with dilute chloroform water, alcohol (90 per cent.) and tinctures of orange and lemon, was included in the British Pharmaceutical Codex, 1923.

Infusum Gentianæ Compositum Recens, B.P.—(Inf. Gent. Co. Rec.)—Fresh Compound Infusion of Gentian. Gentian and dried bitter-orange peel, 1 in 80, and lemon peel, 1 in 40. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Mistura Gentianæ Acida, B.P.C.—(Mist. Gent. Acid.)—Acid Gentian Mixture. Each fluid ounce contains 12 minims of dilute nitro-hydrochloric acid, with syrup of orange, compound infusion of gentian and chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Mistura Gentianæ Alkalina, B.P.C.—(Mist. Gent. Alk.)—Alkaline Gentian Mixture. *Syn.*—Mistura Gentianæ cum Soda. Each fluid ounce contains 15 grains of sodium bicarbonate and 5 grains of ammonium carbonate, with syrup of orange and compound infusion of gentian. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Tinctura Gentianæ Composita, B.P.—(Tinct. Gent. Co.)—Compound Tincture of Gentian. Gentian, 1 in 10, with dried bitter-orange peel and cardamom, prepared by maceration with alcohol (45 per cent.). Dose.—2 to 4 millilitres (½ to 1 fluid drachm).

GLUCOSUM LIQUIDUM
(Glucos. Liq.)
Liquid Glucose

Synonym—Corn Syrup.

Liquid glucose consists of a mixture of dextrose, maltose, dextrin and water, and may be prepared by the hydrolysis of starch. The starch is treated with dilute sulphuric acid and steam is passed through the mixture, or the starch and dilute acid are treated with steam under pressure. The acid is neutralised with calcium carbonate and the solution decolourised and evaporated under reduced pressure It occurs as a colourless or almost colourless, odourless, viscid syrup with a sweet taste. Liquid glucose undergoes direct fermentation, reduces Fehling's solution, and is decomposed by alkalis, becoming brown in colour. It also reduces ammoniacal silver nitrate and an alkaline solution of mercuric cyanide. It is dextrorotatory. Medicinal glucose or dextrose monohydrate, and commercial grades of solid glucose are referred to under Dextrosum.

Miscible with water in all proportions, forming a clear solution; partly soluble in alcohol (90 per cent.).

Standard, B.P.—Liquid glucose has a refractive index at 20° of not less than 1·490. Ash, after ignition with sulphuric acid followed by re-ignition with sulphuric acid, not more than 0·6 per cent. Arsenic limit, 2 parts per million. Lead limit, 2 parts per million. Sulphur dioxide limit, 450 parts per million. It complies also with a limit test for acidity.

Action and Uses.—Liquid glucose is used in place of dextrose for oral or rectal administration. It should not be used, however, for subcutaneous, intravenous, or intrathecal injection. Liquid glucose is also used as a pill excipient, either alone or in the form of Syrupus Glucosi Liquidi. It is specially suitable for use in preparing pills containing ferrous carbonate, since it tends to prevent oxidation of the ferrous salt.

Preparation

Syrupus Glucosi Liquidi, B.P.—(Syr. Glucos. Liq.)—Syrup of Liquid Glucose. *Syn.*—Syrupus Glucosi; Syrup of Glucose. Liquid glucose, 33·3 per cent. w/w, with syrup.

GLYCERINUM
(Glycer.)
Glycerin

$C_3H_8O_3 = 92{\cdot}06$

Synonym—Glycerol.

Glycerin, $CH_2OH{\cdot}CHOH{\cdot}CH_2OH$, is a trihydric alcohol obtained by the hydrolysis of fats and fixed oils by means of alkalis or superheated steam. It occurs as a clear, colourless, odourless, hygroscopic, syrupy liquid, with a sweet taste followed by a sensation of warmth. When exposed to a low temperature for some time, it solidifies to a mass of colourless crystals, melting at about 20°. When heated with potassium bisulphate it gives off irritating vapours of acrolein. When mixed with borax and introduced into a bunsen flame, the flame is tinged green. It should be **stored** in well-closed containers.

Miscible with water and alcohol (90 per cent.); insoluble in ether, chloroform and fixed oils.

Standard, B.P.—Glycerin has a specific gravity of 1·260 to 1·265 (corresponding to from 98 per cent. to 100 per cent. of $C_3H_8O_3$). Refractive index at 20°, 1·470 to 1·473. Ash, not more than 0·01 per cent. Arsenic limit, 4 parts per million. Lead limit, 1 part per million. It becomes not more than faintly yellow and not pink when strongly heated, and on further heating volatilises and burns with little or no charring, and with no odour of burnt sugar. The 10 per cent. w/v aqueous solution is neutral to litmus. It complies also with a test for absence of certain reducing substances, and with limit tests for readily carbonisable substances, fatty acids, iron and copper.

Action and Uses.—Given internally, glycerin is demulcent, laxative, antiseptic and, to some extent, nutritious. It is commonly employed as a sweetening agent in mixtures, especially with ferric chloride and preparations of cascara or cinchona; it renders galenical preparations of the latter drugs more miscible with water. Glycerin is also employed as an ingredient of cough linctuses. In the form of pastilles, prepared with a gelatin basis and flavoured with fruit pastes or essences, or medicated with astringents or antiseptics, it is the most commonly used emollient for the throat. Limited amounts of glycerin may be used in place of sugar to sweeten the food of diabetic patients. Applied **externally,** glycerin acts as an emollient, somewhat resembling the fats in its action, although more irritating. Applied undiluted to mucous membranes, glycerin takes up moisture from the mucous secretions and increases the penetrative action of any drugs held in solution. Injections of sterile glycerin, in quantities ranging from a few millilitres up to 200 millilitres, either into the uterine cavity or into the cervical canal, are used in the prevention and treatment of puerperal infection.

Diluted with one or two volumes of water or rose water, glycerin is

G. glabra and may be split longitudinally. The cork, when present, is somewhat purplish in colour and frequently scaly. The taste is sweet but has a slight bitterness. Persian liquorice is obtained from *G. glabra* var. *violacea* and is usually imported unpeeled; it resembles unpeeled Russian root in appearance. Anatolian and Syrian liquorice are derived from *G. glabra;* they are usually unpeeled, the pieces are sometimes of a very large size, up to as much as 8 centimetres in diameter. Manchurian liquorice, possibly from *G. uralensis* Fisch., has a pale chocolate-brown, readily exfoliated cork, a lacunous wood and conspicuously wavy medullary rays. It contains glycyrrhizin, but is practically free from sugars. Liquorice of Indian origin, derived from *G. glabra*, closely resembles that imported from Spain but is usually cut into lengths of about 10 centimetres.

Standard, B.P.—Liquorice yields not less than 20 per cent. of water-soluble extractive. Ash of the peeled drug, not more than 6 per cent.; of the unpeeled drug, not more than 10 per cent. Acid-insoluble ash, not more than 2·5 per cent.

Liquorice, in powder (Pulvis Glycyrrhizæ : Pulv. Glycyrrh.), is the powder of the peeled drug. It contains the constituents and possesses the diagnostic microscopical characters of Glycyrrhiza, and complies with the standard for the unground, peeled drug.

Action and Uses.—Liquorice is a demulcent and mild expectorant. A decoction of liquorice with linseed or althæa is a domestic remedy for cough and bronchitis. Powdered liquorice is used as a flavouring agent in Pulvis Glycyrrhizæ Compositus; for medicinal use the solid and liquid extracts are usually administered. Extractum Glycyrrhizæ, with sedatives and expectorants, enters into the composition of cough lozenges and pastilles. The liquid extract is used in cough mixtures and to disguise the taste of nauseous medicines, especially the alkali iodides, ammonium chloride, quinine, creosote and liquid extract of cascara. It should, however, be prescribed only in alkaline or neutral solution. Powdered liquorice is frequently used as an absorbent pill excipient.

Dose.– 1 to 4 grammes ($\frac{1}{4}$ to 1 drachm).

ABRI RADIX.—Abrus root, or Indian liquorice, is the root of *Abrus precatorius* Linn. (Fam. Leguminosæ). It has poisonous properties similar to those of the seeds and should not be used as a sweetening agent.

GLYCYRRHIZINUM AMMONIATUM.—Ammoniated glycyrrhizin is prepared from the aqueous extract of liquorice and occurs as a reddish-brown powder or in scales. It is sometimes used as a flavouring agent instead of the liquid extract.

Preparations

Extractum Glycyrrhizæ, B.P.—(Ext. Glycyrrh.)—Extract of Liquorice. A soft aqueous extract. Dose.– 0·6 to 2 grammes (10 to 30 grains).

Extractum Glycyrrhizæ Liquidum, B.P.—(Ext. Glycyrrh. Liq.)—Liquid Extract of Liquorice. An aqueous extract adjusted to a specific gravity of 1·200 and preserved with alcohol. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Pulvis Glycyrrhizæ Compositus, B.P.—(Pulv. Glycyrrh. Co.)—Compound Powder of Liquorice. Peeled liquorice and senna leaf, of each 16 per cent., with fennel, sublimed sulphur and sucrose. Dose.– 4 to 8 grammes (1 to 2 drachms).

Trochisci Glycyrrhizæ, B.P.C.—(Troch. Glycyrrh.)—Liquorice Lozenges. *Syn.*—Brompton Cough Lozenges. Each lozenge contains 3 grains of extract of liquorice and $\frac{1}{2}$ minim of oil of anise.

GOSSYPII CORTEX
(Gossyp. Cort.)
Cotton Root Bark

Synonym—Gossypii Radicis Cortex.

Cotton root bark consists of the dried root bark of *Gossypium herbaceum* Linn. and of other cultivated species of *Gossypium* (Fam. Malvaceæ), perennial plants indigenous to India, and cultivated in India, Egypt and the United States of America.

The root bark occurs in thin, tough and fibrous strips, often channelled or quilled, up to 30 centimetres long, to which long, thin, tapering rootlets are attached at intervals. The outer surface is covered with rough, cinnamon-brown cork, longitudinally striated or wrinkled, easily separated and revealing a paler cortex; the inner surface is whitish, silky and finely striated longitudinally. The fracture is tough and fibrous. The smoothed, transverse section shows a phloem laminated from the presence of alternating layers of fibres and sieve tissue; the outer laminæ, when separated, exhibit on their surfaces minute brownish spots due to resin cells. The odour is distinct and the taste somewhat acrid and astringent.

Cotton root bark **contains** a pale yellow or colourless acid resin, which is present to the extent of about 8 per cent., and becomes bright reddish-brown from absorption of oxygen. From an alcoholic extract of the bark, dihydroxybenzoic acid, salicylic acid and two substances of a phenolic nature have been separated, together with betaine, a fatty alcohol, phytosterol, ceryl alcohol and a mixture of fatty acids. The bark also contains a considerable amount of sugar.

Standard.—Cotton root bark contains not more than 5 per cent. of wood and other foreign organic matter. Acid-insoluble ash, not more than 2 per cent.

Cotton root bark, in powder (Pulvis Gossypii Corticis : Pulv. Gossyp. Cort.), contains the constituents of Gossypii Cortex, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Cotton root bark has been used as an emmenagogue in dysmenorrhœa and as an abortifacient. It is **administered** in the form of decoction, liquid extract and tincture.

Preparations

Decoctum Gossypii Corticis, B.P.C.—(Dec. Gossyp. Cort.)—Decoction of Cotton Root Bark. 1 in 5. Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

This decoction was included in the British Pharmacopœia, 1914, under the name of Decoctum Gossypii Radicis Corticis.

Extractum Gossypii Corticis Liquidum, B.P.C.—(Ext. Gossyp. Cort. Liq.)—Liquid Extract of Cotton Root Bark. 1 in 1. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This liquid extract was included in the British Pharmacopœia, 1914, under the name of Extractum Gossypii Radicis Corticis Liquidum.

Tinctura Gossypii Corticis, B.P.C.—(Tinct. Gossyp. Cort.)—Tincture of Cotton Root Bark. 1 in 4. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

GRANATI FRUCTUS CORTEX
(Granat. Fruct. Cort.)
Pomegranate Rind

Pomegranate rind consists of the dried pericarp separated from the fruit of *Punica Granatum* Linn. (Fam. Punicaceæ), a shrub or small tree cultivated in the countries bordering the Mediterranean Sea.

The rind occurs in thin, curved, irregular pieces, some of which carry the lower part of, or the entire, five-toothed, woody, tubular calyx, which is about 10 to 15 millimetres in diameter and encloses the remains of the style and stigma; other pieces show the scar, about 5 millimetres in diameter, left by the stalk, or a piece of stalk may be attached. The rind is about 1·5 millimetres thick and is coriaceous or woody; the outer surface is granular and brownish-yellow or reddish in colour; the inner surface is marked with angular depressions made by the seeds and with ridges marking the positions of the dissepiments. The rind is odourless and has an astringent taste.

Pomegranate rind **contains** about 28 per cent. of gallotannic acid, together with a yellow colouring matter, but the alkaloids which characterise the bark of the root and stem have not been detected in the rind. The ash is about 4 per cent.

Action and Uses.—Pomegranate rind is a powerful astringent. It may be **administered** in the form of decoction in the treatment of diarrhœa and dysentery and has been used as a douche in leucorrhœa.

Dose.– 1 to 2 grammes (¼ to ½ drachm).

GRANATI RADICIS CORTEX
(Granat. Rad. Cort.)
Pomegranate Root Bark

Synonyms—Granati Cortex; Granatum; Pomegranate.

Pomegranate root bark consists of the dried bark of the stem and root of *Punica Granatum* Linn. (Fam. Punicaceæ), a shrub or small tree cultivated in the countries bordering the Mediterranean Sea.

The root bark occurs in channelled or curved pieces and the stem bark in straighter and more regular pieces, varying usually from 5 to 10 centimetres in length and from 1 to 3 centimetres in width. The outer surface of the root bark is rough, dull earthy in appearance and often

exhibits conchoidal depressions where portions of the outer layer have exfoliated owing to the formation of cork. The outer surface of the stem bark is smoother, with shallow, longitudinal, corky furrows, but only a few conchoidal depressions, and it is marked with the minute dark apothecia of lichens. The inner surface of both barks is smooth and yellowish, often with brown patches. The fracture is short and granular, and the smoothed, transverse section is nearly white, with numerous, fine, tangential and radial lines. Pomegranate root bark has an astringent and slightly bitter taste

The diagnostic **microscopical** characters are the occasional patches of lignified cork cells, strongly thickened on the inner walls; the very numerous cluster-crystals of calcium oxalate, arranged singly in the parallel, tangential rows of cells of the phloem parenchyma; the numerous, uniseriate, secondary medullary rays; the occasional, large, thick-walled stone-cells, occurring singly or in groups of 2 or 3; the small, scattered starch grains, about 2 to 8 microns wide; the absence of fibres.

Pomegranate root bark **contains** several volatile alkaloids of which pelletierine and pseudo-pelletierine (N-methylgranatonine) are present in greatest proportion. Pure pelletierine alkaloid is a colourless liquid which rapidly absorbs oxygen and becomes brown and resinous. The question whether it occurs in an optically active form in the plant is still undecided. The optically inactive base boils at 106°/21 mm. Pseudo-pelletierine is crystalline, melts at 48·5° and boils at 246°. Other alkaloids present in smaller quantities are *iso*pelletierine, methyl*iso*-pelletierine and α-N-methylpiperidyl-2-propane-β-one. The base known as methylpelletierine is perhaps identical with methyl*iso*-pelletierine. The bark also contains about 22 per cent. of gallotannic acid. The total alkaloid present varies, in good samples, from 0·5 to 0·9 per cent., stem bark containing about 0·5 per cent. of alkaloids. The drug yields from 5 to 13 per cent of ash.

Standard.—Pomegranate root bark contains not more than 2 per cent. of wood or other foreign organic matter.

Pomegranate root bark, in powder (Pulvis Granati Radicis Corticis: Pulv. Granat. Rad. Cort.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Pomegranate root bark is very astringent and unpleasant to the taste owing to the large quantity of tannin present. It is used in the form of decoction (1 in 5) to expel tape-worm, a dose of 60 millilitres (2 fluid ounces) being given every two hours for four doses. Pomegranate root bark is not purgative; its use as a vermifuge must, therefore, be preceded and followed by a brisk purge, such as castor oil. Poisonous symptoms from the absorption of pelletierine have occurred; these take the form of giddiness, confusion of thought, and great muscular weakness

Dose.– 1 to 2 grammes (¼ to ½ drachm).

GRINDELIA
(Grindel.)
Grindelia

Synonyms—Grindelia Robusta; Gum Plant.

Grindelia consists of the dried leaves and flowering tops of *Grindelia camporum* Greene (Fam. Compositæ), a perennial herb growing in the plains to the south-west of the Rocky Mountains. The leaves and tops are collected when the plants are flowering and fruiting, and dried. It should be **stored** in a cool, dry place.

The stems are smooth, rounded, and yellow or rose-tinted. The leaves are pale green, 2 to 5 centimetres long, oblong or spathulate, with a serrate margin; they are rigid, brittle, sessile or amplexicaul, and have a glabrous, minutely dotted surface. The capitula are up to 2 centimetres in diameter, yellow, hard and resinous, with several rows of lanceolate-acuminate, imbricated, recurved bracts, within which is a single row of yellow, ligulate florets and a central group of tubular, disc florets, each of the ovaries or compressed fruits being bi-auriculate at the summit and crowned by a pappus, consisting of one or two stiff, thick bristles. All parts are more or less covered with resin, especially the capitula. The odour is slight and the taste balsamic.

The diagnostic **microscopical** characters are the isobilateral structure of the leaves; the multicellular, sessile, broadly ovoid, glandular trichomes, 45 to 100 microns in diameter, occurring in depressions in the epidermis, and containing minute calcium oxalate rosettes in the epithelial cells; the numerous, lignified, bast fibres and small vessels, and pollen grains characteristic of the Compositæ.

Grindelia **contains** amorphous resins (more than 20 per cent.). Other constituents are hentriacontane, a crystalline phytosterol, various glycerides, *l*-dextrose, tannin, colouring matter and a trace of volatile oil. It yields to alcohol (90 per cent.) about 20 to 25 per cent. of extractive.

Standard.—Grindelia contains not more than 10 per cent. of stem of a diameter greater than 2 millimetres or other foreign organic matter. Acid-insoluble ash, not more than 2 per cent.

Grindelia, in powder (Pulvis Grindeliæ : Pulv. Grindel.), contains the constituents and possesses the diagnostic microscopical characters of Grindelia, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—The action of grindelia probably depends upon the depression of sensory nerve endings. It is used in spasmodic asthma, whooping cough, bronchitis and hay fever. It is also employed in heart disease to slow and regulate the pulse, and has been used in cystitis and in catarrh of the urinary passages. It is **administered** in the form of liquid extract, the rather nauseous taste of which may be masked with chloroform or glycerin. A lotion made by diluting the liquid extract

(1 in 10) is used in the treatment of dermatitis caused by the poison ivy (*Rhus toxicodendron*).

Preparation

Extractum Grindeliæ Liquidum, B.P.C.—(Ext. Grindel. Liq.)—Liquid Extract of Grindelia. 1 in 1. Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

This liquid extract was included in the British Pharmacopœia, 1914.

GUAIACI LIGNUM

(Guaiac. Lign.)

Guaiacum Wood

Synonym—Lignum Vitæ.

Guaiacum wood is the heartwood of *Guaiacum officinale* Linn. and of *G. sanctum* Linn. (Fam. Zygophyllaceæ), evergreen trees, the former indigenous to the West Indian Islands and the north coast of South America, the latter indigenous to South Florida and the Bahama Islands.

The heartwood is dull greenish-brown in colour, dense, and heavier than water. The freshly smoothed, transverse surface shows alternating, concentric, light and dark brown bands (spring and autumn wood), traversed by the fine lines of the numerous, closely arranged medullary rays. The wood splits unevenly longitudinally owing to the irregular course of the fibres. The drug, when warmed, has an aromatic odour, and the taste is slightly acrid. Guaiacum wood frequently occurs in chips or turnings, the latter light brown, becoming green on exposure to light. The sap wood, which should not be present in appreciable quantity, is lighter, and pale yellowish-brown in colour.

The diagnostic **microscopical** characters are the numerous thick-walled, tortuous fibres; the medullary rays, which are one cell wide and from 4 to 6 cells high; the large vessels, and the brown resin present in the vessels and in the cells of the parenchyma and medullary rays; the prisms of calcium oxalate in the wood parenchyma.

Guaiacum wood **contains** from 18 to 25 per cent. of resin, consisting of guaiaretic, guaiaconic and guaiacic acids; to guaiaconic acid is due the blue colouration produced by oxidising agents. It also contains two bodies, guaiacsaponic acid and guaiacsaponin, as well as a substance resembling gutta percha, termed guaiaguttin.

Action and Uses.—Guaiacum wood is not much used in medicine; it is an ingredient of Decoctum Sarsæ Compositum.

GUAIACI RESINA

(Guaiac. Res.)

Guaiacum Resin

Guaiacum resin may be obtained from the wood of *Guaiacum officinale* Linn. or of *G. sanctum* Linn. (Fam. Zygophyllaceæ) by

extraction with alcohol or by the purification of the crude resin which is obtained by heating the wood. Guaiacum resin should be **stored** in well-stoppered, amber-coloured bottles.

The resin occurs in rounded or ovoid tears, frequently covered with a dull green powder, or in large blocks, the latter being the usual form. It breaks easily, with a clear, glassy fracture, thin pieces being transparent and exhibiting a colour varying from yellowish-green to reddish-brown. The powder is grey, but becomes green on exposure to light and air. It has a slightly acrid taste and, when warmed, an aromatic odour. A solution in alcohol is coloured blue on the addition of ferric chloride solution.

Guaiacum resin **contains** the resin acids, α- and β-guaiaconic acids (about 70 per cent.), guaiaretic acid (about 11 per cent.) and a small proportion of guaiacic acid. It also contains guaiac β-resin (15 per cent.) and small quantities of guaiac-yellow, vanillin and guaiacsaponin. α-Guaiaconic acid is readily converted by oxidising agents (ferric chloride, ozone, hydrogen peroxide, chromic acid, etc.) into a deep blue substance termed guaiac-blue.

Soluble in alcohol, ether, chloroform, creosote, and in solutions of the alkalis and of chloral hydrate.

Standard.—Guaiacum resin leaves not more than 4 per cent. of ash. 1 gramme of the resin, in powder, shaken for five minutes with 5 millilitres of light petroleum yields a colourless filtrate which does not become green when shaken with an equal volume of dilute copper acetate solution (absence of colophony). Not more than 10 per cent. is insoluble in alcohol (90 per cent.).

Action and Uses.—Guaiacum resin is a mild laxative and diuretic. For its supposed action upon the mucous membrane of the throat, it is used in the form of lozenge and pastille. In acute tonsillitis it is given in powder or as Mistura Guaiaci. Guaiacum resin is employed in chronic rheumatism and gout; it sometimes relieves the pain and inflammation, and if taken between the attacks may lessen the tendency to recurrence. It is said to be of some service in dysmenorrhœa, 0·6 gramme (10 grains) being given three times daily. It can be administered in powder, cachets, or capsules. Tinctura Guaiaci Ammoniata is used in mixture form, and should be prescribed with mucilage of tragacanth (1 part in 8 parts of mixture) to suspend the resin. A freshly prepared tincture of guaiacum is employed with ozonic ether as a test for blood. Lozenges or cachets of guaiacum and sulphur are used in chronic rheumatism; Confectio Guaiaci Composita is a domestic remedy used for the same purpose.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Confectio Guaiaci Composita, B.P.C.—(Conf. Guaiac. Co.)—Compound Confection of Guaiacum. *Syn.*—Chelsea Pensioner. Guaiacum resin, 1 per cent., rhubarb, 2 per cent., and sublimed sulphur, 14·5 per cent., with potassium acid tartrate, nutmeg and purified honey. Dose.– 4 to 8 grammes (1 to 2 drachms).

Mistura Guaiaci, B.P.C.—(Mist. Guaiac.)—Guaiacum Mixture. Each fluid ounce contains about 11 grains of guaiacum resin, with sucrose, tragacanth and cinnamon water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This mixture was included in the British Pharmacopœia, 1914.

Tabellæ Guaiaci et Sulphuris, B.P.C.—(Tab. Guaiac. et Sulphur.)—Tablets of Guaiacum and Sulphur. Each tablet contains 3 grains of sublimed sulphur and 3 grains of guaiacum resin. Dose.– 1 to 3 tablets.

Tinctura Guaiaci, B.P.C.—(Tinct. Guaiac.)—Tincture of Guaiacum. *Syn.*— Tincture of Guaiac. 1 in 5. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tinctura Guaiaci Ammoniata, B.P.C.—(Tinct. Guaiac. Ammon.)—Ammoniated Tincture of Guaiacum. Guaiacum resin, 1 in 5, strong solution of ammonia, about 1 in 13, with oil of nutmeg and oil of lemon. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

Trochisci Guaiaci Resinæ, B.P.C.—(Troch. Guaiac. Res.)—Guaiacum Resin Lozenges. Each lozenge contains 3 grains of guaiacum resin.

This lozenge, containing 0·2 gramme of guaiacum resin, was included in the British Pharmacopœia, 1914.

GUAIACOL

(Guaiacol)

Guaiacol

Guaiacol consists chiefly of the monomethylether of *o*-dihydroxybenzene, $C_6H_4(OCH_3)OH$, and may be obtained by fractional distillation of wood-tar creosote, or produced synthetically by heating a mixture of equimolecular proportions of catechol, potassium hydroxide and potassium methylsulphate in a closed vessel at 170° to 180°. It occurs as a colourless, oily, highly refractive liquid or as colourless crystals. It has a penetrating odour and a caustic taste. On the addition of a trace of ferric chloride to a saturated aqueous solution of guaiacol, a blue colour is produced which rapidly changes to brown, the solution becoming turbid. Guaiacol in liquid form may be distinguished from creosote by shaking with ten times its volume of sulphuric acid; the colour produced is yellow and not reddish-brown.

Soluble in water (1 in 80); miscible with alcohol (90 per cent.), ether and fixed and volatile oils.

Standard, B.P.—Guaiacol has a specific gravity (liquid form) of 1·116 to 1·125 and a melting-point (crystals) of about 28°. Not less than 95 per cent. distils between 200° and 210°. Residue when heated on a water-bath, not more than 0·1 per cent. It complies also with tests for the absence of organic impurities and hydrocarbons.

Action and Uses.—Guaiacol is an antiseptic and deodorant, and is used in place of creosote for internal administration in phthisis. It is better tolerated than creosote, but its action as an antiseptic is less powerful. It is less toxic, but a better antiseptic, than phenol. It is apt to irritate the gastric mucous membrane, and in large doses it depresses

the basal ganglia of the brain, and may, like acetanilide, cause collapse. Besides its antiseptic action on the alimentary canal, guaiacol is also antipyretic, the temperature being lowered in the same way as by phenacetin or sodium salicylate. Guaiacol appears in the urine as sulphonate and glycuronate, the latter reduces copper salts and may be mistaken for sugar; a small proportion is oxidised in the system.

Many esters of guaiacol are employed in medicine. These are usually tasteless, and they generally pass through the stomach unchanged, but are decomposed in the intestine with liberation of guaiacol. Guaiacol is commonly **administered** dissolved in oil and enclosed in gelatin capsules which may contain from 0·06 to 0·3 millilitre (1 to 5 minims), or more, in each. It may advantageously be given dissolved in cod-liver oil, either floating on water, as an emulsion, or in capsules. Pills of guaiacol are prepared with soap and powdered liquorice as excipients, in the same manner as creosote pills. It is also administered in combination with iodine as an iodised tincture of guaiacol.

Guaiacol is applied **externally,** diluted with oil or hydrous wool fat (1 in 5 to 1 in 10), to the skin over rheumatic joints, and in orchitis, tuberculosis, pneumonia, pleurisy and neuralgia. Dissolved in olive oil (5 per cent.), it is used as an intra-laryngeal injection in phthisis, as a throat paint and as a hypodermic injection. The hypodermic administration is said, however, to have no advantage over the oral method and may cause collapse.

Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

GUAIACOLIS BENZOAS.—Guaiacol benzoate is a colourless, crystalline powder which is administered in cachets containing 0·2 to 0·6 gramme (3 to 10 grains) as an intestinal antiseptic.

GUAIACOLIS CINNAMAS.—Guaiacol cinnamate occurs as white crystals. It is administered in incipient phthisis in doses of 0·3 to 1 gramme (5 to 15 grains).

GUAIACOLIS VALERIANAS.—Guaiacol valerianate is a liquid administered in capsules containing 0·12 to 1 millilitre (2 to 15 minims) as an intestinal antiseptic.

Preparation

Nebula Guaiacolis et Mentholis, B.P.C.—(Neb. Guaiacol. et Menthol.)—Guaiacol and Menthol Spray. Guaiacol, 2 per cent. w/v, and menthol, 4 per cent. w/v, in light liquid paraffin.

GUAIACOLIS CARBONAS

(Guaiacol. Carb.)

Guaiacol Carbonate

$C_{15}H_{14}O_5 = 274·1$

Guaiacol carbonate, $(CH_3O·C_6H_4·O)_2,CO$, is the carbonic ester of guaiacol, and may be obtained by passing carbonyl chloride slowly into guaiacol previously dissolved in sodium hydroxide solution, washing the

precipitate and crystallising from alcohol. It occurs as a white, crystalline powder, almost without taste and odour. The salt is decomposed by alcoholic potassium hydroxide solution, and guaiacol is liberated from the solution on the addition of excess of acid.

Soluble in alcohol (1 in 70); insoluble in water.

Standard.—Guaiacol carbonate melts between 85° and 88°. Ash, not more than 0·1 per cent. The saturated alcoholic solution is neutral to moistened litmus paper and on the addition of ferric chloride solution no bluish-green colour is produced (absence of free guaiacol). When dissolved in 20 parts of sulphuric acid, not more than a faint yellow colour is produced (limit of foreign organic matter).

Action and Uses.—Guaiacol carbonate is a non-irritating form in which to administer guaiacol in fermentative diarrhœa, typhoid fever and phthisis. It passes through the stomach unchanged, but liberates guaiacol in the intestine, where it is absorbed; its use in phthisis is due to the fact that it is an antiseptic and tends to diminish the amount of secondary infection. In rheumatoid arthritis, good results have followed its use in combination with potassium iodide.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

GUARANA

(Guaran.)

Guarana

Synonyms—Paullinia; Brazilian Cocoa.

Guarana is prepared from the seeds of *Paullinia Cupana* H.B. and K. (Fam. Sapindaceæ), a climbing plant indigenous to Brazil and Uruguay. The seeds, collected when ripe, are washed and roasted to loosen them from a papery shell, from which they are partially freed by beating; the kernels are crushed, made into a paste with water, and divided into masses of varying size which are dried in the sun or by the heat of a slow fire.

The drug usually occurs in hard, heavy, cylindrical pieces from 10 to 30 centimetres long and 25 to 40 millimetres thick. The outer surface is almost smooth and is chocolate-brown in colour; internally are pale, irregular fragments embedded in a dark reddish mass. It has a slightly bitter taste but no marked odour.

The diagnostic **microscopical** characters of guarana, which yields a reddish-brown powder, are the numerous, rounded or polygonal, parenchymatous cells filled with more or less gelatinised starch; the fragments of the dark brown epidermis of the seed, consisting of palisade cells which in surface view have wavy outlines; the parenchymatous cells, with beaded or coarsely pitted walls, of the inner portion of the seed coat.

Guarana **contains** from 3·5 to 5 per cent. of caffeine, catechutannic acid, starch, and a little fat.

Standard.—Guarana contains not less than 3·5 per cent. of caffeine, calculated as anhydrous.

Guarana, in powder (Pulvis Guaranæ : Pulv. Guaran.), contains the constituents and possesses the diagnostic microscopical characters of Guarana, and complies with the standard for the unground drug.

Assay.—To 6 grammes, finely powdered, add 120 millilitres of chloroform, shake and, after allowing to stand five minutes, add 6 millilitres of dilute solution of ammonia, and shake the mixture continuously during one hour. Allow the mixture to stand over-night, again shake intermittently during thirty minutes, and allow to settle. Filter off 100 millilitres of the chloroform solution, equivalent to 5 grammes of the drug, and evaporate to dryness. Treat the residue with 10 millilitres of warm N/5 sulphuric acid, cool, filter into a separator, and wash the dish and filter with successive small portions of water. Make the solution alkaline with sodium hydroxide solution and extract the caffeine immediately by shaking with successive portions of chloroform, washing each portion with about 10 millilitres of water contained in a second separator. Evaporate the chloroform, dry at 100°, and weigh the residue of anhydrous caffeine.

Action and Uses.—Guarana is used for the same purposes as caffeine; it is especially employed for sick headache, and is sometimes used as an astringent in diarrhœa and dysentery. It may be **administered** in powder form in a cachet, or mixed with water to form a draught. Elixir of guarana is a pleasant liquid form of the drug; tincture of guarana is suitable for use in mixture form.

Dose.– 0·6 to 4 grammes (10 to 60 grains).

Preparations

Elixir Guaranæ, B.P.C.—(Elix. Guaran.)—Elixir of Guarana. Tincture of guarana, 4 in 5, with oil of cinnamon, syrup and alcohol (60 per cent.). Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Tinctura Guaranæ, B.P.C.—(Tinct. Guaran.)—Tincture of Guarana. 1 in 4. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

GUTTA PERCHA

(Gutt. Perch.)

Gutta Percha

Gutta percha consists of the dried, purified latex of *Palaquium oblongifolium* Burck, *P. borneense* Burck, *Payena Leerii* Kurz, *P. Treubii* Burck and other species (Fam. Sapotaceæ), large trees indigenous to the Malay Archipelago. The latex is commonly collected by felling the trees and cutting transverse or oblique channels in the bark,

in which it collects and coagulates. The crude product is kneaded under hot water and made into flattened cakes, which are further purified by rolling, shredding and kneading.

Gutta percha occurs in lumps or blocks of variable, but often large, size; externally, it is of a brown or greyish-brown colour; internally, it is reddish-yellow or reddish-grey with a laminated or fibrous appearance. It has a characteristic odour and is flexible although only slightly elastic. It is partly soluble in benzene, oil of turpentine and carbon disulphide, and almost entirely soluble in chloroform.

Gutta percha **contains** the hydrocarbon gutta, $(C_5H_8)_n$, which, when pure, is white and minutely crystalline, a number of albans, which are crystalline and soluble in boiling alcohol, fluavils, also crystalline but soluble in cold alcohol, and albanans, which are insoluble in alcohol. In addition to these substances, small quantities of tannin, salts and an unstable substance, guttan, are present.

Uses.—Gutta percha is used for the preparation of solution of gutta percha, which is employed as a substitute for collodion, and with which chrysarobin, resorcinol, and other medicaments may be incorporated for application to the skin. Spread in thin sheets, as gutta percha tissue, it is used as a covering for moist dressings and poultices to delay evaporation or to prevent soiling the linen. A prepared gutta percha is used as a temporary filling in dentistry.

Chicle, or chicle gum, is the dried latex of *Achras Sapota* Linn. (Fam. Sapotaceæ), indigenous to Mexico, Central America, and the north of South America. It occurs in large blocks varying in colour from grey to brick red, with darker spots and veins. The crude latex is washed and kneaded in hot water, yielding a product of a greyish-white colour. It has a granular, powdery fracture, but becomes plastic when worked between the fingers. When chewed, chicle should be almost tasteless and form a plastic mass which should not adhere to the teeth. The constituents of chicle are similar to those of gutta percha, but there is a larger proportion of resin and less gutta. Mixtures of varying proportions of rubber, resins and waxes occur in commerce under the name of chicle gum, but may be distinguished from genuine chicle by their tough and smooth texture. Chicle is used in the manufacture of chewing-gum.

Preparations

Liquor Gutta Percha, B.P.C.—(Liq. Gutt. Perch.)—Solution of Gutta Percha. *Syn.*—Traumaticin. Gutta percha, 10 per cent. w/w, in chloroform.

Tela Gutta Percha, B.P.C.—(Tel. Gutt. Perch.)—Gutta Percha Tissue. Gutta percha in thin sheets.

HÆMATOXYLUM

(Hæmatox.)

Logwood

Logwood is the unfermented heartwood of *Hæmatoxylon campechianum* Linn. (Fam. Leguminosæ), a tree indigenous to Central America, but naturalised in the West Indian Islands. The wood is exported as logs from which both the bark and sapwood have been

removed. Yucatan (Campeachy) logwood is considered the best; Jamaica logwood has less tinctorial power.

Logwood occurs in hard, compact, heavy logs or billets, dull orange to purplish-red externally, and reddish-brown internally; the smoothed, transverse surface shows narrow, closely set medullary rays and narrow, concentric, dark brown zones alternating with paler ones. The chips or coarser particles have a slight, agreeable odour and a sweet, astringent taste. When 0·1 gramme of very small chips is boiled with 5 millilitres of water and filtered, the filtrate on the addition of calcium hydroxide solution gives a purplish-blue colour.

The unfermented drug **contains** about 10 per cent. of a colourless, crystalline body, hæmatoxylin. Exposed to the air, hæmatoxylin gradually acquires a reddish colour. Its solution in ammonia, which is brownish-violet in colour, absorbs oxygen from the air, forming the ammonia compound of hæmatein from which the hæmatein can be obtained in crystals having a yellowish-green iridescence. It is this change that takes place during the fermentation of the chips. Logwood also contains tannin, resin and a trace of volatile oil.

Substitutes.—Fermented logwood chips are distinguished by their darker colour and the green lustre on portions of the surface, and usually contain from 10 to 20 per cent. of moisture. The fermentation of logwood is often avoided by the use of an oxidising mordant, such as potassium dichromate. Bastard logwood is of a very low quality and is apparently derived from a variety of *H. campechianum*.

Standard.—Logwood contains not more than 2 per cent. of foreign organic matter.

Action and Uses.—Logwood is used as a mild astringent in diarrhœa. It may be administered in the form of decoction or liquid extract Preparations of logwood may colour the stools and urine red; they are **incompatible** with metallic salts, especially those of iron and mercury. Compound solutions of hæmatoxylin are used in histology to stain the nuclei of cells.

Preparations

Decoctum Hæmatoxyli, B.P.C.—(Dec. Hæmatox.)—Decoction of Logwood. Logwood, 1 in 20, and cinnamon, 1 in 100. Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

This decoction was included in the British Pharmacopœia, 1914.

Extractum Hæmatoxyli Liquidum, B.P.C.—(Ext. Hæmatox. Liq.)—Liquid Extract of Logwood. *Syn.*—Liquid Extract of Hæmatoxylon. 1 in 1. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

HÆMOGLOBINUM
(Hæmoglob.)

Hæmoglobin

Hæmoglobin is the red colouring matter of blood. It may be obtained by adding to defibrinated blood ten times its volume of 3 per cent.

sodium chloride solution, allowing the mixture to stand for a day or two for the red corpuscles to subside, separating the clear liquid and shaking the deposit with water and an equal volume of ether; the aqueous layer is separated and cooled in ice, one quarter of its volume of alcohol is added and the mixture cooled to −5°, when the hæmoglobin crystallises out. The product obtained by this or by any similar process is the oxygen compound of hæmoglobin, known as oxyhæmoglobin. Hæmoglobin is a combination of the protein, globin, with the iron-containing, coloured compound, hæmatin ($C_{34}H_{30}O_4N_4$ Fe·OH). The separation of these two compounds can be effected with extreme ease and occurs when hæmoglobin is treated with weak alkalis, weak acids, or when heated above 70°. The hæmoglobins of different animals differ to a marked extent owing to variations in the nature of the globin group, but the hæmatin group is apparently constant in composition.

Pure hæmoglobin **contains** about 0·34 per cent. of iron, about 16 per cent. of nitrogen and 0·6 per cent. of sulphur It has been shown that hæmoglobin always contains traces of copper, which appears to be essential for its formation in the body. In hæmocyanin, an analogous substance occurring in the blood of cephalopods, the iron is wholly replaced by copper. Hæmoglobin crystallises in plates, prisms or needles of the rhombic system, differing in form according to the animal from which it is obtained.

The material usually employed for pharmaceutical purposes is in the form of scales, powder, or paste of a dark reddish-brown colour, and should be readily and almost completely **soluble** in water. Hæmoglobin preponderates in venous blood, but in arterial blood is largely oxidised to oxyhæmoglobin. The combination of oxygen in oxyhæmoglobin is a very loose one and the oxygen may be removed by exposure in a vacuum. Hæmoglobin also readily combines with acetylene, and with carbon monoxide forming carboxyhæmoglobin which is a much more stable compound than oxyhæmoglobin. Owing to its stability, cases of coal-gas poisoning are generally fatal. When hæmoglobin with a trace of sodium chloride is heated with glacial acetic acid and cooled, crystals of hæmatin hydrochloride (hæmin) are formed. The crystals are of characteristic form and are used as a means of identifying blood stains. Hæmoglobin, oxyhæmoglobin and carboxyhæmoglobin can be identified by their absorption spectra.

Action and Uses.—Hæmoglobin has been used as a substitute for the salts of iron in the treatment of anæmia, especially of the secondary type, but it is generally conceded that it is distinctly inferior. Hæmoglobin is less irritant to the stomach than are the simple salts of the metal. It is converted to hæmatin in the stomach and then passes through the bowel, very little, if any, absorption taking place. Hæmoglobin may be **administered** in cachets, capsules, and tablets, or as Elixir Hæmoglobini.

Dose.– 0·3 to 2 grammes (5 to 30 grains)

Preparations

Elixir Hæmoglobini, B.P.C.—(Elix. Hæmoglob.)—Elixir of Hæmoglobin. Hæmoglobin, 1 in 10, with glycerin, alcohol (90 per cent.), syrup, distilled water and vanillin. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Extractum Malti Liquidum cum Hæmoglobino, B.P.C.—(Ext. Malt. Liq. c. Hæmoglob.)—Liquid Extract of Malt with Hæmoglobin. *Syn.*—Malt and Hæmoglobin. Hæmoglobin, 1 in 8, in glycerin and liquid extract of malt. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

HAMAMELIDIS CORTEX

(Hamam. Cort.)

Hamamelis Bark

Synonym—Witch Hazel Bark.

Hamamelis bark is obtained from *Hamamelis virginiana* Linn. (Fam. Hamamelidaceæ), a shrub indigenous to the United States and Canada. The bark is collected in the spring and dried.

The bark occurs in thin, channelled or curved pieces, about 1·5 millimetres thick, up to 2 centimetres broad and 5 to 20 centimetres long. The outer surface is covered with a dull, smooth (or, in older pieces, scaly), grey cork marked with transverse lenticels, or, when the cork has been removed, with a smooth, pale reddish-brown cortex. The inner surface is pale reddish-pink, finely striated longitudinally, occasionally with small pieces of white wood adhering. The fracture of the cork and cortex is short and that of the phloem fibrous. The odour is slight and the taste astringent and slightly bitter. The smoothed, transverse surface exhibits a dark grey cork layer, a pale brown cortex, a narrow, dark brown layer of pericyclic sclerenchyma, and a wide, reddish-brown phloem Solution of ferric chloride gives a bluish-black colouration with the powder or when applied to the transversely cut surface of the bark.

The diagnostic **microscopical** characters are the groups of fibres, accompanied by files of crystal cells containing prisms of calcium oxalate; the abundant stone cells, often unevenly thickened; the presence of only a few small, rounded starch grains; the absence of cluster-crystals of calcium oxalate.

Hamamelis bark **contains** about 6 per cent. of tannin, partly crystalline hamamelitannin, and partly amorphous. Gallic acid, resin, fat, a phytosterol and other bodies are also present. It yields to alcohol (45 per cent.) about 20 per cent. of extractive.

Standard.—Hamamelis bark contains not more than 2 per cent. of foreign organic matter.

Hamamelis bark, in powder (Pulvis Hamamelidis Corticis : Pulv. Hamam. Cort.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Hamamelis bark is a local astringent and hæmostatic. The tincture diluted with water is used as a lotion for small wounds, bruises and inflammatory swellings, and is applied externally or injected into the rectum in the treatment of piles.

Preparation

Tinctura Hamamelidis, B.P.C.—(Tinct. Hamam.)—Tincture of Hamamelis. 1 in 10. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

HAMAMELIS

(Hamam.)

Hamamelis

Synonyms—Hamamelidis Folia; Hamamelis Leaves; Witch Hazel Leaves.

Hamamelis consists of the dried leaves of *Hamamelis virginiana* Linn. (Fam. Hamamelidaceæ), a shrub indigenous to the United States and Canada. It is also used in the fresh condition.

The leaves are about 7 to 15 centimetres in length, brittle, dark green or brownish-green, broadly oval or rhomboid-ovate. The petiole is about 1 to 1·5 centimetres long; the margin is sinuate, the apex acute, the base cordate and unequal, the venation pinnate, and the lateral veins straight, running out to the margin, where each ends in a tooth, prominent on the under surface which bears numerous stellate hairs. The odour is not marked and the taste is bitter and astringent.

The diagnostic **microscopical** characters are the characteristic stellate hairs, consisting of 4 to 12 cells united at the base; the epidermal cells with wavy walls; the large, prismatic crystals of calcium oxalate in the endodermis; the large, lignified, slightly branched idioblasts.

Hamamelis **contains** tannin, gallic acid, a bitter principle and a trace of volatile oil.

Standard, B.P.—Hamamelis contains not more than 2 per cent. of foreign organic matter, and not more than 3 per cent. of stems.

Hamamelis, in powder (Pulvis Hamamelidis : Pulv. Hamam.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Hamamelis has properties similar to those of hamamelis bark. The liquid extract is used as a local astringent, diluted with 20 to 30 parts of water, and was formerly given internally in order to arrest hæmorrhage. Liquor Hamamelidis is used as a cooling lotion for bruises, as a lotion for piles, and, well diluted, as a constituent of eye lotions. Unguentum Hamamelidis is used as an astringent application to piles, and Extractum Hamamelidis, in the form of suppositories

containing 2 to 5 grammes, is also used; they may be combined with cocaine, extract of belladonna, zinc oxide, or bismuth subgallate.

Preparations

Extractum Hamamelidis, B.P.C.—(Ext. Hamam.)—Extract of Hamamelis. *Syn.*—Hamamelin; Hamamelidin. A dry alcoholic extract. Dose.–0·06 to 0·3 gramme (1 to 5 grains).

Extractum Hamamelidis Liquidum, B.P.—(Ext. Hamam. Liq.)—Liquid Extract of Hamamelis. 1 in 1. It is prepared from the dried leaves with alcohol (45 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Pasta Hamamelidis, B.P.C.—(Past. Hamam.)—Hamamelis Paste. *Syn.*—Witch Hazel Cream. A non-greasy stearate cream containing about 50 per cent. w/v of solution of hamamelis.

Liquor Hamamelidis, B.P.C.—(Liq. Hamam.)—Solution of Hamamelis. *Syn.*—Distilled Witch Hazel. A 1 in 1 solution prepared by distillation from the fresh leaf.

This solution was included in the British Pharmacopœia, 1914.

Suppositorium Hamamelini et Zinci Oxidi, B.P.C.—(Supp. Hamam. et Zinc. Oxid.)—Hamamelin and Zinc Oxide Suppository. Each suppository weighs 30 grains (2 grammes) and contains 3 grains of extract of hamamelis and 10 grains of zinc oxide.

Unguentum Hamamelidis, B.P.C.—(Ung. Hamam.)—Hamamelis Ointment. Liquid extract of hamamelis, 10 per cent., in wool fat and yellow soft paraffin.

This ointment, prepared with 60 per cent. of wool fat, and 30 per cent. of yellow soft paraffin, was included in the British Pharmacopœia, 1914.

HELLEBORUS
(Helleb.)

Hellebore

Synonyms—Black Hellebore; Helleborus Niger.

Hellebore consists of the rhizome and roots of *Helleborus niger* Linn. (Fam. Ranunculaceæ), a herbaceous perennial cultivated in England, but growing wild in abundance on the lower Alps of Central Europe.

The rhizome occurs in small, dark sepia-brown, very tortuous pieces, from about 2 to 6 centimetres in length and 4 to 8 millimetres in diameter. The upper surface of the rhizome shows cup-shaped scars, about 5 or 6 millimetres in diameter, of aerial stems and the under surface shows very numerous, circular root-scars and attached roots, about 1 to 2 millimetres thick, which are easily broken off and are finely wrinkled longitudinally. The smoothed, transverse surface of the rhizome exhibits a rather wide, brown cortex, a circle of about 3 to 10 wedge-shaped, paler xylem bundles, separated by well-marked medullary rays; in the centre is a small brown pith. The transverse surface of the root shows a wide cortex and a small, pale yellow stele occupying about one third of the

total diameter. The odour is slight and the taste bitter and acrid; the powdered drug is powerfully sternutatory.

The diagnostic **microscopical** characters are the abundant starch grains; the brown-walled cells of the tegumentary tissues; the spiral and reticulate vessels; the absence of crystals of calcium oxalate.

Hellebore **contains** two crystalline glycosides, helleborin and helleborein. It yields to alcohol (90 per cent.) from 30 to 40 per cent. of extractive.

Substitutes.—The rhizome of *H. viridis* Linn. cannot be distinguished from that of *H. niger* by any definite morphological characters; the rhizome of *H. fœtidus* Linn. is stated to show little or no pith and the wood is more strongly developed. In addition to glycosides, both these rhizomes contain several alkaloids. Hellebore should not be confused with white hellebore, the rhizome of *Veratrum album* Linn., or with green hellebore, the rhizome of *Veratrum viride* Ait.

Action and Uses.—Hellebore is a powerful hydragogue cathartic and emmenagogue. It is poisonous in large doses, producing violent inflammation of the gastric and intestinal mucous membranes. Applied locally, the fresh root is violently irritant. Helleborin is a narcotic; helleborein, although a member of the digitalis group of glycosides, is not at all, or only very slightly, absorbed from the alimentary canal.

HEMIDESMUS

(Hemides.)

Hemidesmus

Synonym—Indian Sarsaparilla.

Hemidesmus is the dried root of *Hemidesmus indicus* R. Br. (Fam. Asclepiadaceæ), a climbing plant indigenous to India and Ceylon.

The root is tortuous, rigid, shrunken, and simple or only slightly branching. It occurs in pieces of varying length, usually from 10 to 30 centimetres, and from 3 to 6 millimetres thick. It varies in colour from dull red to dark brown, bears only a few wiry rootlets, and is marked at frequent intervals with encircling cracks that penetrate the cork and occasionally the bark. The thin layer of cork easily separates from the bark, and is in places detached from it. The wood is pale yellow and porous. Laticiferous cells are present in the phloem. The aerial stems, which are attached to the crown of the root, are slender and exhibit alternate leaf-scars. The odour recalls that of Tonka bean and the taste is aromatic and sweetish.

Hemidesmus **contains** a volatile, acidic principle which has not been fully investigated.

Action and Uses.—Hemidesmus is used in India in place of sarsaparilla. In the form of syrup, it is sometimes used as a flavouring agent.

HEXAMINA
(Hexamin.)

Hexamine

$C_6H_{12}N_4 = 140{\cdot}1$

Synonyms—Methenamina; Hexamethylenetetramine.

Hexamine, $(CH_2)_6N_4$, may be prepared by the action of ammonia on formaldehyde. It occurs in colourless, odourless crystals or as a white, crystalline powder, with a taste which is sweetish at first but afterwards bitter. On heating, it sublimes at about 263° without melting, and with partial decomposition and evolution of a disagreeable odour. It burns readily with a blue, non-luminous flame. When warmed with acids, it is decomposed, with formation of the ammonium salt of the acid and evolution of formaldehyde. When a small quantity is mixed with an equal weight of salicylic acid and heated with sulphuric acid, a carmine-red colour is produced. The aqueous solution has an alkaline reaction and gives a precipitate with tannic acid and with mercuric chloride solution, the precipitate in the latter case becoming crystalline on standing.

Soluble in water (1 in 1·5) and alcohol (90 per cent.) (about 1 in 8).

Standard, B.P.—Hexamine contains not less than 99 per cent. of $C_6H_{12}N_4$. Ash, not more than 0·05 per cent. Arsenic limit, 2 parts per million. Lead limit, 2 parts per million

Action and Uses.—Hexamine is employed as a disinfectant of the urinary system in the treatment of cystitis and urinary infections. Although belief in its supposed conversion into formaldehyde has been largely discredited, it is frequently prescribed after the urine has first been rendered acid by the administration of sodium acid phosphate. There is evidence that some formaldehyde is slowly evolved; the quantity may be insufficient to destroy the bacteria but is enough to inhibit their growth and thereby produce a beneficial effect on bacilluria. It has been used in the treatment of poliomyelitis and encephalitis lethargica since it is secreted into the cerebrospinal fluid. Hexamine is also excreted in the bile and on this account has been used with benefit in the treatment of cholecystitis. In these circumstances, doses as large as 6 grammes (90 grains) dissolved in water may be given thrice daily, after meals; at the same time 4 grammes (60 grains) of sodium bicarbonate and 4 grammes (60 grains) of potassium citrate are given in order to prevent irritation of the kidneys. Doses of 1 gramme (15 grains) of hexamine, given four times daily, are said to abort the common cold. It has also been recommended in various respiratory affections, such as acute rhinitis, acute bronchitis and whooping cough, because of its antiseptic effect when excreted by the saliva and bronchial mucous membrane.

Intravenous injections of hexamine have been reported to be of value in pneumonia, typhoid fever, post-operative anuria, cholecystitis, dysuria and cystitis. The usual dose by intravenous injection is 5 millilitres

(75 minims) of a 40 per cent. w/v solution, repeated twice or thrice in twenty-four hours. Solutions for **injection** may be sterilised by filtration. When administered orally, hexamine should be taken with a large volume of water and may be prescribed in solution flavoured with syrup of orange. In cystitis, it is frequently given with methylene blue in tablets, or, in the treatment of gonorrhœa, with sandalwood oil in capsules. When ignited, hexamine burns with a smokeless flame and generates an intense heat. A 5 grain tablet will burn with evolution of sufficient heat to boil 4 or 5 millilitres of water and can also be used to sterilise hypodermic needles, probes, etc., by flaming.

Dose.– 0·6 to 2 grammes (10 to 30 grains)

HEXYL-RESORCINOL

(Hexyl-resorcin.)

Hexyl-resorcinol

$C_{12}H_{18}O_2 = 194{\cdot}1$

Hexyl-resorcinol is 4-*n*-hexylresorcinol and may be prepared by condensing hexoic acid with resorcinol by means of zinc chloride, and reducing the hexoyl-resorcinol so formed with aluminium amalgam in alcoholic hydrochloric acid. It forms white needles or a fine, white, crystalline powder, having a pungent odour and a sharp astringent taste. A green colour is produced when a trace of ferric chloride solution is added to an alcoholic solution.

Slightly **soluble** in water (1 in 2000), readily soluble in alcohol, ether and glycerin; very slightly soluble in light petroleum.

Standard.—Hexyl-resorcinol does not melt below 66° Ash, not more than 0·1 per cent.

Action and Uses.—Hexyl-resorcinol is a bactericide used especially as a genito-urinary antiseptic. It is suitable for **internal** administration and is non-toxic in therapeutic doses, non-irritating to the urinary tract, and is active in both acid and alkaline urine. Hexyl-resorcinol appears to be more particularly effective when the infecting agents are in the nature of gram-positive organisms, such as staphylococci or streptococci, and less so in the case of coliform and gonococcal infections. Hexyl-resorcinol is best **administered**, dissolved in olive oil, in capsules. It is used in the treatment of pyelitis and cystitis and other infections of the urinary tract. In the pyelitis of infancy and childhood marked improvement in general health and nutrition has frequently been observed following its administration in the form of a 2·5 per cent. solution in olive oil; one fluid-drachm of this contains 0·1 gramme of hexyl-resorcinol and may be given three times a day. Some intestinal irritation may occur in the first few days but soon passes off, and treatment should be persisted in. Hexyl-resorcinol, in doses of 0·5 to 1 gramme, has been used as an anthelmintic

for both round-worms and hook-worms, but its value does not appear to be superior to that of other drugs used for the same purpose.

Hexyl-resorcinol may be used **externally** as a disinfectant of skin and mucous membrane; a solution, 1 in 1000, in a mixture of 3 parts of glycerin and 7 parts of water, by volume, has been found to be the most effective. This solution has the property of reducing surface tension and is said consequently to be more penetrative in action. Some observers state that it is somewhat irritating to the skin and mucous membrane. Hexyl-resorcinol solution may be used for the disinfection of wounds and abrasions and weaker solutions can be applied as a spray or gargle to mucous surfaces.

Dose.– 0·12 to 0·6 gramme (2 to 10 grains).

HIRUDO
(Hirudo)
Leeches

Leeches are fresh-water annelids; the speckled or German leech and the green or Hungarian leech are varieties of *Hirudo medicinalis* Linn. (Fam. Hirudinidæ). For medicinal use they are bred in ponds near Hanover, in Germany, and in the South of France; the Australian, or five striped leech, *H. quinquestriata* Schmarda, is found in the Australasian colonies, where it is used instead of the European varieties. Leeches are **stored** in unglazed earthenware pans, half filled with soft water and having pebbles, turf, or moss and charcoal on the bottom; the pans should be covered with muslin. They are kept in a shady place at a temperature between 10° and 20°.

Leeches have soft, smooth bodies marked with from 90 to 100 annulations, about 10 to 12 centimetres long when fully extended, and 3 to 3·5 centimetres when fully contracted, the width in the former condition being from 0·8 to 1 centimetre and in the latter from 1·5 to 1·8 centimetres; they taper towards their extremities, each of which is provided with a disc-shaped sucker. The anterior sucker is the smaller and surrounds the triradiate jaws, by which the leech effects an incision in the skin. The dorsal surface of the speckled leech is olive-green, with six longitudinal stripes, and the ventral surface is greenish-yellow with black spots. The green leech is similar on the dorsal surface, but the ventral surface is olive-green and not spotted. The Australian leech is yellowish-brown on the dorsal surface, which is marked with five longitudinal stripes, and the ventral surface is greenish-yellow and not spotted.

The buccal secretion of leeches **contains** a substance named hirudin, which retards the coagulation of blood. It may be extracted by treating the minced heads with physiological salt solution, at a temperature of 38° to 40°, and can be obtained in brownish lamellæ or light masses. It is readily soluble in water, but insoluble in alcohol and ether.

Action and Uses.—Leeches are applied to a vascular part of the body for the purpose of withdrawing blood from it, thus allaying local inflammation and congestion. The part to be bitten should first be cleansed, moistened with sugar solution and the leech applied by means of a leech glass or perforated pill box Each leech draws, on an average, about 6 millilitres of blood. The blood drawn does not coagulate, owing to its admixture with the secretion which contains hirudin. If persistent hæmorrhage follows the removal of leeches, it may be arrested by means of a styptic or by the pressure of a pad of cotton fixed with a bandage. Hirudin has been used to prevent the clotting of blood during transfusion and in the treatment of dysmenorrhœas accompanied by clotting.

HOLARRHENA

(Holarr.)

Holarrhena

Synonyms—Kurchi; Conessi Bark; Telicherry Bark.

Holarrhena consists of the bark from the stem and root of *Holarrhena antidysenterica* Wall. (Fam. Apocynaceæ), a small tree growing in India.

The bark occurs in curved, channelled or quilled pieces about 1 to 6 centimetres long, 1 to 4 centimetres wide and 1 to 7 millimetres thick. The outer surface is greyish-brown to reddish-brown, frequently covered by grey lichens and showing small black apothecia of lichens, the thicker pieces being rugose and showing numerous yellowish warts. The inner surface is cinnamon-brown, longitudinally striated and frequently has portions of the pale yellow wood attached. The fracture is short and granular; the smoothed, transverse surface is reddish-brown and shows abundant yellowish groups of sclereids with minute, glittering points scattered throughout; only a very few starch grains are present. The drug has no odour and the taste is at first faint and afterwards bitter

Holarrhena **contains** the alkaloid conessine, $C_{24}H_{40}N_2$, and also a considerable number of subsidiary alkaloids, as many as ten having been described

Substitute.—The bark of *Wrightia tinctoria* Br (Fam Apocynaceæ) has often been substituted for holarrhena and can be distinguished by the presence of abundant small starch grains filling the cells of the parenchyma. It contains indican

Action and Uses.—Holarrhena has been used for the treatment of amoebic dysentery in India for many years. It is best **administered** in the form of a liquid extract in daily doses of 25 to 30 millilitres (6 to 8 fluid drachms). The total alkaloid extracted from the bark, which has been stated to be a more powerful antidysenteric than ametine, is also non-emetic and less toxic; in combination with bismuth iodide

it is known as kurchi-bismuth-iodide and may be administered in doses of 0·6 gramme (10 grains), twice daily, 4 grammes (1 drachm) of sodium bicarbonate and 2·6 grammes (40 grains) of sodium citrate being given thirty minutes previously.

Dose.– 0·25 to 0·6 gramme (4 to 10 grains).

HOMATROPINÆ HYDROBROMIDUM

(Homatrop. Hydrobrom.)

Homatropine Hydrobromide

$C_{16}H_{21}O_3N,HBr = 356·1$

Homatropine hydrobromide is the salt of an alkaloid homatropine which may be obtained by heating tropine and mandelic acid with dilute hydrochloric acid on a water-bath for several days. The alkaloidal base is liberated from the product by means of an alkali, extracted with chloroform and treated with hydrobromic acid, the resulting hydrobromide being purified by recrystallisation. It occurs as a colourless, odourless, crystalline powder which is neutral to litmus. When the alkaloidal base, obtained by the addition of solution of ammonia to an aqueous solution of the hydrobromide, shaking out with chloroform and evaporating the solvent, is warmed with a small quantity of a 1 in 50 solution of mercuric chloride in alcohol (60 per cent.), a yellow precipitate is produced, becoming brick-red. This reaction distinguishes homatropine from most other alkaloids except atropine and hyoscyamine.

Soluble in water (1 in 6), alcohol (90 per cent.) (1 in 18), and dehydrated alcohol (1 in 133); readily soluble in warm alcohol; slightly soluble in chloroform; insoluble in ether.

Standard, B.P.—Homatropine hydrobromide melts at about 214°, with partial decomposition. Ash, not more than 0·1 per cent. It complies also with limit tests for alkaloids precipitated by tannic acid, and for atropine, hyoscyamine and hyoscine.

Action and Uses.—Homatropine is seldom used internally. Its action is similar to that of atropine, but is less powerful. The chief use of homatropine is in ophthalmology to dilate the pupil. Its effect on the eye is similar to that of atropine, but its action is more rapid, persists for a shorter time and passes off in about twenty-four hours. In combination with cocaine its mydriatic action is enhanced. Homatropine has less tendency to increase the intra-ocular tension than atropine, on account of its less prolonged action.

Homatropine hydrobromide is used in aqueous solution, either alone or with cocaine, or as Lamella Homatropinæ, or as a 1 per cent. ointment for the eye, or the alkaloid may be used as a 2 per cent. solution in castor oil. In cases of **poisoning** by homatropine or its salts, emetics should be given or the stomach evacuated and washed out by means of the stomach pump; 10 grains of tannic acid in solution is then given.

In the excitement stage, chloroform or ether may be necessary to control the spasms. In the stage of depression, caffeine, oxygen, or artificial respiration may be employed. Pilocarpine is useless as an antidote to poisoning by homatropine. Solutions of homatropine hydrobromide for **injection** may be sterilised by tyndallisation or by filtration, and the containers should comply with the tests for limit of alkalinity of glass.

Dose.– 0·001 to 0·002 gramme ($\frac{1}{64}$ to $\frac{1}{32}$ grain).

Preparation

Lamella Homatropinæ, B.P.—(Lamell. Homatrop.)—Lamella of Homatropine. Each lamella contains 0·00065 gramme ($\frac{1}{100}$ grain) of homatropine hydrobromide.

HYDRARGYRI CYANIDUM

(Hydrarg. Cyanid.)

Mercuric Cyanide

$C_2N_2Hg = 252·6$

Synonym—Mercury Cyanide.

Mercuric cyanide, $Hg(CN)_2$, may be prepared by the action of hydrocyanic acid on mercuric oxide, keeping the former in slight excess. It occurs in colourless, transparent or white, prismatic, anhydrous, odourless crystals with a nauseating, metallic taste. It is not decomposed by alkalis; dilute hydrochloric acid, however, decomposes it with evolution of hydrocyanic acid. On heating, it decomposes into mercury and cyanogen.

Soluble in water (1 in 13), boiling water (1 in 3), alcohol (1 in 20) and glycerin (1 in 4); sparingly soluble in ether.

Standard.—Mercuric cyanide contains not less than 99 per cent of $Hg(CN)_2$. Residue on ignition, not more than 0·1 per cent. A 5 per cent. aqueous solution is neutral to litmus and, on the gradual addition of a few drops of potassium iodide solution, does not yield a red precipitate soluble in excess of the precipitant, or a white precipitate with silver nitrate solution (limit of mercuric chloride). No red colouration is produced on the addition of a few drops of phenolphthalein solution to a solution of mercuric cyanide in sodium chloride solution (limit of mercuric oxycyanide).

Assay.—Dissolve about 0·4 gramme, accurately weighed, in 50 millilitres of water, add 1 gramme of sodium chloride, followed by 2 to 3 grammes of potassium iodide, and titrate with N/10 hydrochloric acid using methyl orange as indicator; each millilitre of N/10 hydrochloric acid is equivalent to 0·01263 gramme of $Hg(CN)_2$.

Action and Uses.—Mercuric cyanide is a powerful antiseptic, having the general properties of mercuric salts (see Hydrargyri Perchloridum)

Although quite soluble, it is almost non-ionised and is, therefore, less poisonous than mercuric chloride. It is given internally in syphilis, usually in pill form, the salt being carefully triturated with lactose and massed with a very small quantity of glycerin of tragacanth. A 1 per cent. solution, with or without cocaine, may be injected intravenously, or deeply into muscular tissue, in doses of 1 millilitre daily or on alternate days. **Externally,** mercuric cyanide is used as a paint (1 in 50 to 1 in 100) for syphilitic sores, especially of the tongue and throat, but it must be used with caution. Solutions (1 in 2000 to 1 in 4000) are used as antiseptic eye lotions. A solution (1 in 500) has been employed in ophthalmia neonatorum and (1 in 1000) in ordinary ophthalmia. Solutions for **injection** may be prepared by aseptic methods. In cases of **poisoning** by mercuric cyanide, the antidotes recommended for mercuric chloride may be employed.

Dose.– 0·004 to 0·008 gramme ($\frac{1}{16}$ to $\frac{1}{8}$ grain).

HYDRARGYRI ET ZINCI CYANIDUM

(Hydrarg. et Zinc. Cyanid.)

Mercury and Zinc Cyanide

Synonyms—Zinc and Mercury Cyanide; Lister's Salt.

Mercury and zinc cyanide was at one time thought to be a definite compound of the formula $HgZn(CN)_4$, but later the formula $Zn_4Hg(CN)_{10}$ was suggested, and it has also been described as a trizincic monomercuric octacyanide of the formula $Zn_3Hg(CN)_8$, with a maximum percentage of 38·5 of mercuric cyanide. As it suffers some decomposition during precipitation, owing to the water present, it is usually of varying composition. It is now regarded as merely an intimate mixture of the cyanides, or, at best, a very indefinite molecular combination. It may be prepared by mixing cold solutions of equimolecular quantities of zinc potassium cyanide and mercuric chloride, or of mercuric potassium cyanide and zinc sulphate, washing the precipitate with cold water until the washings are nearly free from mercury, and drying by exposure to the air or, preferably, in a desiccator. By the use of saturated solutions of the reacting salts in equimolecular proportions, a product containing a maximum of about 38 per cent. of mercuric cyanide is obtained; the use of weaker solutions, or of the salts in any proportion other than equimolecular, results in a product weaker in mercuric cyanide. Mercury and zinc cyanide occurs as a white, odourless, amorphous powder.

Very slightly **soluble** in water; soluble in dilute acids.

Action and Uses.—Mercury and zinc cyanide is a powerful germicide and antiseptic, especially suitable for the medication of gauze, wool, lint, etc., since it is not reduced by contact with the organic material of which the dressing is composed. An ointment

(1 per cent. in soft paraffin) is used for syphilitic sores. Mercury and zinc cyanide is frequently coloured with a minute proportion (1 in 50,000) of aniline violet, but, in dispensing, the untinted salt must be used.

Preparation

Carbasus Hydrargyri et Zinci Cyanidi, B.P.C.—(Carbas. Hydrarg. et Zinc. Cyanid.)—Mercury and Zinc Cyanide Gauze. *Syn.*—Double Cyanide Gauze. It contains from 0·5 to 1·5 per cent. of mercury, calculated as $Hg(CN)_2$, and from 1·5 to 3·0 per cent. of zinc, calculated as $Zn(CN)_2$.

HYDRARGYRI IODIDUM FLAVUM

(Hydrarg. Iod. Flav.)

Yellow Mercurous Iodide

HgI = 327·5

Yellow mercurous iodide may be prepared by adding to a solution of mercurous nitrate, slowly and with constant stirring, a solution of potassium iodide, collecting the precipitate and washing by decantation until the washings no longer give an acid reaction to litmus. The precipitate is then dried in the dark at a temperature not exceeding 40° It occurs as a bright yellow, heavy, odourless and tasteless powder. Exposure to light darkens the colour by causing decomposition into metallic mercury and mercuric iodide. Hydrochloric acid and sulphuric acid affect it only slightly. Nitric acid converts it into a white, crystalline, double compound of mercuric oxide and nitrate. When heated to about 70°, it becomes red, and assumes its original yellow colour on cooling. On heating strongly, it volatilises, giving off dark violet vapours. In contact with potassium iodide solution the salt is converted into mercuric iodide, which dissolves, leaving a residue of metallic mercury. It should be **stored** in amber-coloured or black bottles.

Almost **insoluble** in water; insoluble in alcohol and ether.

Standard.—Yellow mercurous iodide, determined by the method of the British Pharmacopœia for Hydrargyri Subchloridum, contains not less than 99 per cent. of HgI, calculated on the substance dried over sulphuric acid; each millilitre of N/10 iodine is equivalent to 0·03275 gramme of HgI. Loss on drying over sulphuric acid, not more than 0·5 per cent. Residue on volatilisation, not more than 0·2 per cent. It complies with the limit tests for soluble mercury salts and chlorides in Hydrargyri Iodidum Rubrum.

Action and Uses.—Yellow mercurous iodide is used for the treatment of syphilis in cases which are unable to tolerate arsphenamine or bismuth. The usual dose for this purpose is $\frac{1}{8}$ grain taken thrice daily in tablet form. An ointment, 1 in 8 (Unguentum Hydrargyri

Iodidi Flavi) is sometimes used for application to enlarged glands and in the treatment of chronic skin diseases. Yellow mercurous iodide is **incompatible** with soluble chlorides or iodides owing to its tendency to form mercuric salts.

Dose.– 0·008 to 0·03 gramme ($\frac{1}{8}$ to $\frac{1}{2}$ grain).

HYDRARGYRI IODIDUM RUBRUM

(Hydrarg. Iod. Rub.)

Red Mercuric Iodide

$HgI_2 = 454·5$

Synonym—Mercuric Iodide.

Red mercuric iodide may be obtained by the interaction of solutions of mercuric chloride and potassium iodide. It occurs as a scarlet-red powder which becomes yellow when heated above 150° and assumes its original colour on cooling. At about 350° it fuses and volatilises, forming a yellow, crystalline sublimate. Red mercuric iodide is readily soluble in an aqueous solution of potassium iodide, forming a solution of double iodide of mercury and potassium, such as the compound of the formula $HgI_2,2KI$; it is also soluble in solutions of mercuric chloride.

Almost **insoluble** in water; soluble in alcohol (90 per cent.) (1 in 300), ether (1 in 150), castor oil (1 in 50) and olive oil (1 in 230).

Standard, B.P.—Red mercuric iodide contains not less than 99 per cent. of HgI_2. Residue on volatilisation, not more than 0·1 per cent. It complies also with limit tests for soluble mercury compounds and for chloride.

Action and Uses.—Red mercuric iodide is more powerfully antiseptic than mercuric chloride, but is not so irritating, since it combines less readily with albumin. It is administered **internally** for syphilis in solution with potassium iodide, as Liquor Arseni et Hydrargyri Iodidi, or in tablets. It may also be given in the form of a solution with potassium iodide (1 per cent. w/v of each), in doses of 0·5 millilitre (8 minims) by intramuscular injection, which, however, cause some pain. A solution of mercuric iodide in olive oil is also used for hypodermic injection. **Externally,** mercuric iodide is a powerful local irritant. Solutions in water or alcohol may be obtained by the addition of four-fifths of its weight of potassium iodide. Solutions so prepared are much used in surgical practice, aqueous solutions (1 in 2000 to 1 in 5000) for application to wounds, and spirituous solutions (1 in 500 to 1 in 2000) for rendering the skin and hands aseptic. Solution-tablets, such as Solvellæ Hydrargyri Iodidi, are used for the extemporaneous preparation of mercuric iodide solutions for external use. For use as a vaginal douche, solutions of mercuric iodide (1 in 5000 to 1 in 10,000) are employed. Unguentum Hydrargyri Iodidi Rubri

is used for ringworm and lupus and for syphilitic lesions; it is sometimes employed diluted from two to four times. In veterinary practice, a strong ointment (1 to 4) is used to produce vesication. In cases of **poisoning** by mercuric iodide, the antidotes described under Hydrargyri Perchloridum should be employed.

Dose.– 0·002 to 0·004 gramme ($\frac{1}{32}$ to $\frac{1}{16}$ grain).

Preparations

Liquor Arseni et Hydrargyri Iodidi, B.P.—(Liq. Arsen. et Hydrarg. Iod.)—Solution of Arsenous and Mercuric Iodides. *Syn.*—Donovan's Solution. It contains 1 per cent. w/v of red mercuric iodide (limits, 0·95 to 1·05) and total arsenic equivalent to 1 per cent. w/v of arsenic triiodide (limits, 0·95 to 1·05), in distilled water. 1 millilitre contains the equivalent of about 0·01 gramme, and 15 minims about $\frac{1}{4}$ grain, of each salt. The arsenous compound in the solution is rapidly oxidised to the arsenic state in contact with air. The solution should be freshly prepared or, if not used immediately, it should be stored in well-filled containers and protected from light. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Sirupus hydrargyri iodidi cum Kalii iodido I.A. contains 0·05 per cent. of mercuric iodide and 2·5 per cent. of potassium iodide.

Liquor Saponis Antisepticus, B.P.C.—(Liq. Sap. Antisept.)—Antiseptic Solution of Soap. *Syn.*—Antiseptic Ethereal Soap; Solutio Saponis Antiseptica. Ethereal solution of soap with 0·05 per cent. w/v of mercuric iodide and of potassium iodide.

Solvellæ Hydrargyri Iodidi, B.P.C.—(Solv. Hydrarg. Iod.)—Mercuric Iodide Solution-Tablets. *Syn.*—Soluble Biniodide Tablets. Each tablet contains $8\frac{3}{4}$ grains of mercuric iodide, with potassium iodide and eosin; one tablet dissolved in 20 fluid ounces of water forms a solution containing 1 in 1000 of mercuric iodide.

Unguentum Hydrargyri Iodidi Rubri, B.P.C.—(Ung. Hydrarg. Iod. Rub.)—Red Mercuric Iodide Ointment. *Syn.*—Ointment of Mercuric Iodide. Red mercuric iodide, 4 per cent., in benzoinated lard.

This ointment was included in the British Pharmacopœia, 1914.

HYDRARGYRI IODIDUM VIRIDE

(Hydrarg. Iod. Vir.)

Green Mercurous Iodide

Synonyms—Green Iodide of Mercury; Protoiodide of Mercury.

Green mercurous iodide may be prepared by triturating mercury with a little alcohol and gradually adding iodine in successive small quantities. The trituration should be continued until globules of mercury are no longer visible and the powder is of a uniform greenish-yellow colour. Green mercurous iodide occurs as a greenish-yellow, odourless and tasteless powder. The greenish colour is due to the blue of free mercury blending with the yellow of true mercurous iodide, HgI. On strongly heating, it melts to a brown liquid and then volatilises completely. It is decomposed by exposure to light into mercuric iodide and metallic mercury, by chlorine, into mercuric chloride and

mercuric iodide, by nitric acid into mercuric nitrate and mercuric iodide and by soluble iodides into mercuric iodide and metallic mercury. It contains from about 65 to 75 per cent. of mercury.

Insoluble in water, alcohol and ether.

Action and Uses.—Green mercurous iodide is less potent than the yellow iodide, and is given in syphilis in doses of 0·02 gramme (⅓ grain) three times daily, gradually increased. It is **incompatible** with soluble iodides and chlorides.

Dose.– 0·01 to 0·06 gramme (⅙ to 1 grain).

HYDRARGYRI OXIDUM FLAVUM

(Hydrarg. Oxid. Flav.)

Yellow Mercuric Oxide

$HgO = 216·6$

Yellow mercuric oxide may be obtained by the interaction of aqueous solutions of mercuric chloride and sodium hydroxide, collecting, washing, and drying the precipitate. It occurs as an orange-yellow, odourless, amorphous powder readily soluble in acids, giving solutions of mercuric salts. When yellow mercuric oxide is heated gently, the colour darkens to red, and when strongly heated, it is decomposed, giving metallic mercury and oxygen. It should be **stored** protected from light.

Insoluble in water and alcohol (90 per cent.).

Standard, B.P.—Yellow mercuric oxide contains not less than 99·3 per cent. of HgO, calculated on the substance dried at 150° for one hour. Loss when heated at 150° for one hour, not more than 1 per cent. Residue on ignition, not more than 0·5 per cent. When shaken with water, the water remains neutral to litmus. It complies also with limit tests for mercurous salts and for chloride.

Action and Uses.—Yellow mercuric oxide is an antiseptic. If taken by the mouth it is converted in the stomach into mercuric chloride and acts as such. Yellow mercuric oxide forms the principal ingredient of Lotio Hydrargyri Flavum, which is used as an application to venereal sores. In the form of an ointment, the oxide is used in the treatment of syphilitic eruptions, chronic eczema, pityriasis and other skin affections. Oculentum Flavum is largely used in ophthalmic practice for application to the eyelids in ophthalmia tarsi and conjunctivitis. When making eye ointments containing the oxide it is usual to incorporate the freshly precipitated oxide, while still moist, with the basis, in order to ensure its reduction to the finest possible state of subdivision and so reduce irritation to a minimum. Pagenstecher's ointment, which is also used for application to the eyes, contains 4 per cent. of the oxide. When Oculentum Hydrargyri **Oxidi** is prescribed, and the proportion of oxide is not

stated by the prescriber, the ointment containing 1 per cent. of yellow mercuric oxide in Oculentum Simplex must be dispensed. Yellow mercuric oxide is **incompatible** with cocaine hydrochloride, mercuric chloride being rapidly formed. The ointment should not be used while iodides are being given internally.

Preparations

Lotio Hydrargyri Flavum, B.P.C.—(Lot. Hydrarg. Flav.)—Yellow Mercurial Lotion. *Syn.*—Yellow Wash. It contains freshly precipitated mercuric oxide, prepared from solution of calcium hydroxide and about 0·5 per cent. w/v of mercuric chloride.

This lotion was included in the British Pharmacopœia, 1914.

Oculentum Atropinæ cum Hydrargyri Oxido, B.P.—(Oculent. Atrop. c. Hydrarg. Oxid.)—Atropine and Yellow Mercuric Oxide Ointment for the Eye. Atropine sulphate, 0·125 per cent., and yellow mercuric oxide, 1 per cent., in simple eye ointment. It should be stored in small, well-closed containers in a cool place and protected from light.

A similar ointment for the eye, prepared with moist yellow mercuric oxide ointment, atropine and yellow soft paraffin, was included in the British Pharmaceutical Codex, 1923.

Oculentum Flavum, B.P.C.—(Oculent. Flav.)—Yellow Eye Ointment. Moist yellow mercuric oxide ointment, 10 per cent., in simple eye ointment; it contains 1 per cent. of yellow mercuric oxide.

Oculentum Hydrargyri Oxidi, B.P.—(Oculent. Hydrarg. Oxid.)—Yellow Mercuric Oxide Ointment for the Eye. Yellow mercuric oxide, 1 per cent., in simple eye ointment. It should be stored in small, well-closed containers in a cool place and protected from light.

An ointment for the eye, prepared with 10 per cent. of moist yellow mercuric oxide ointment and yellow soft paraffin, was included in the British Pharmaceutical Codex, 1923, *under the name of Oculentum Flavum*

Unguentum Hydrargyri Flavi, B.P.C.—(Ung. Hydrarg. Oxid. Flav.)—Yellow Mercuric Oxide Ointment. Yellow mercuric oxide, 2 per cent., with liquid paraffin, in yellow soft paraffin.

This ointment, prepared without the liquid paraffin, was included in the British Pharmacopœia, 1914.

Unguentum Hydrargyri Oxidi Flavi Humidi, B.P.C.—(Ung. Hydrarg. Oxid. Flav. Humid.)—Moist Yellow Mercuric Oxide Ointment. It contains approximately 10 per cent. of freshly precipitated yellow mercuric oxide in wool fat, 12·5 per cent., and yellow soft paraffin.

HYDRARGYRI OXIDUM RUBRUM

(Hydrarg. Oxid. Rub.)

Red Mercuric Oxide

$HgO = 216·6$

Synonyms—Red Precipitate; Red Oxide of Mercury.

Red mercuric oxide may be prepared by heating mercurous nitrate until acid vapours cease to be evolved. It occurs in orange-red crystalline scales or, when levigated, as a red powder. It should be **stored** in well-stoppered bottles and protected from light.

Insoluble in water; soluble in dilute hydrochloric acid and dilute nitric acid.

Standard.—Red mercuric oxide, determined by the method of the British Pharmacopœia for Hydrargyri Oxidum Flavum, contains not less than 99·3 per cent. of HgO, calculated on the substance dried at 150°. Loss on drying at 150°, not more than 1 per cent. Residue on volatilisation, not more than 0·3 per cent. It complies with the test for neutrality and the limit test for chloride in Hydrargyri Oxidum Flavum. When 0·5 gramme is heated on a water-bath with a solution of 1 gramme of oxalic acid in 10 millilitres of water and 1 millilitre of dilute solution of ammonia, no change of colour is produced within two hours (distinction from yellow mercuric oxide). Solutions prepared by dissolving 0·5 gramme in 25 millilitres of dilute hydrochloric acid or dilute nitric acid are not more than slightly turbid (limit of mercurous compounds).

Action and Uses.—Red mercuric oxide is seldom used internally. It is applied in the form of Unguentum Hydrargyri Oxidi Rubri as a parasiticide, for application to syphilitic ulcers, in chronic eczema and in the treatment of seborrhœa and alopecia. Owing to its crystalline character and the difficulty of obtaining it as a minutely subdivided powder, red mercuric oxide is too irritating for ophthalmic use. For the preparation of ointments, the oxide should be in the finest possible powder.

Dose.– 0·004 to 0·016 gramme ($\frac{1}{16}$ to $\frac{1}{4}$ grain).

Preparation

Unguentum Hydrargyri Oxidi Rubri, B.P.C.—(Ung. Hydrarg. Oxid. Rub.)—Red Mercuric Oxide Ointment. *Syn.*—Red Precipitate Ointment. Red mercuric oxide, 10 per cent., in yellow paraffin ointment.

This ointment was included in the British Pharmacopœia, 1914.

HYDRARGYRI OXYCYANIDUM

(Hydrarg. Oxycyanid.)

Mercuric Oxycyanide

$HgO,3Hg(CN)_2 = 974·5$

Mercuric oxycyanide may be prepared by triturating, until finely powdered and intimately mixed, 15 parts of mercuric oxide, 60 parts of mercuric cyanide and 15 parts of water; after a few minutes, 2 parts of 20 per cent. w/v solution of sodium hydroxide are added, and trituration continued until the mixture is white, a further 42·5 parts of water being added gradually to form a cream, which is finally made just acid to phenolphthalein with acetic acid. This cream is added in successive small quantities to a boiling solution of 30 parts of mercuric cyanide in 550 parts of boiling water, complete solution being allowed to take place between each addition. The liquid is filtered at or near

the boiling-point and cooled rapidly to 15° with agitation, when the oxycyanide separates and is collected and dried at a temperature not above 35°. It occurs as a white, crystalline powder with an alkaline reaction. It is free from the liability to explode which is exhibited by other basic cyanides of mercury. The compound having the formula $HgO,Hg(CN)_2$ has given rise to fatal accidents during manufacture, since it is liable to explode with some violence when heated to 180°, or during the processes of drying and grinding.

Soluble in water (about 1 in 18).

Standard, B.P.—Mercuric oxycyanide contains not less than 20 per cent. and not more than 22 per cent. of HgO, and not less than 77 per cent. and not more than 79 per cent. of $Hg(CN)_2$. Loss on drying at 100°, not more than 1 per cent. Residue on ignition, not more than 0·1 per cent. It complies also with a limit test for chloride.

Action and Uses.—Mercuric oxycyanide is a powerful antiseptic which does not precipitate albumin, and in dilute solution does not attack metals. It does not ionise in solution, so that it does not exert either a cyanide or a mercurial action. Solution of mercuric oxycyanide (1 in 500) is used to irrigate the conjunctiva in ophthalmia neonatorum and weaker solutions (1 in 1000 to 1 in 5000) are used in conjunctivitis; dilute solutions (1 in 5000 to 1 in 10,000) are used as injections in gonorrhœa, and a stronger solution (1 in 200) is used for wounds and for sterilising surgical instruments. For internal administration in syphilis it is given in pills containing 0·01 gramme ($\frac{1}{6}$ grain) in each. Intravenous injections are employed in the treatment of syphilis and septicæmia. Mercuric oxycyanide should not be employed while potassium iodide is being given internally Solutions for **injection** may be prepared by aseptic methods.

Dose.- 0·005 to 0·01 gramme ($\frac{1}{12}$ to $\frac{1}{6}$ grain), by intramuscular injection; 0·01 gramme ($\frac{1}{6}$ grain), by intravenous injection

Preparation

Solvellæ Hydrargyri Oxycyanidi, B.P.C.—(Solv. Hydrarg. Oxycyanid.)—Mercuric Oxycyanide Solution-Tablets. Each tablet contains nearly 4½ grains of mercuric oxycyanide coloured with eosin. One tablet dissolved in 20 fluid ounces of water forms a solution containing 1 in 2000 of mercuric oxycyanide

HYDRARGYRI PERCHLORIDUM

(Hydrarg. Perchlor.)

Mercuric Chloride

$HgCl_2 = 271·5$

Synonyms—Hydrargyri Chloridum Corrosivum; Perchloride of Mercury; Corrosive Sublimate.

Mercuric chloride may be obtained by the direct combination of mercury and chlorine, or by heating a mixture of mercuric sulphate

and sodium chloride with a small amount of manganese dioxide, and collecting the sublimate. It occurs as a heavy, white, crystalline powder, or in colourless or white, rhombic, crystalline masses. When heated, mercuric chloride fuses to a colourless liquid at about 265°; above 300° it volatilises as a dense, white cloud. The aqueous solution has an acid reaction to litmus, but becomes neutral on the addition of sodium chloride.

Soluble in water (1 in 18), alcohol (90 per cent.) (1 in 4), ether (1 in 4) and glycerin (1 in 2).

Standard, B.P.—Mercuric chloride contains not less than 99·5 per cent. of $HgCl_2$. Residue on volatilisation, not more than 0·1 per cent. It complies also with a test for complete solubility in water.

Action and Uses.—The action of mercuric chloride may be taken as typical of that of the more soluble salts of mercury They differ from the salts of other metals, except those of arsenic, in that they are rapidly absorbed The soluble mercury salts are powerful antiseptics and disinfectants; a 1 in 1000 solution of the perchloride is perhaps the most efficient disinfectant for general use, but even a dilution of 1 in 1,000,000 will inhibit the growth of the anthrax bacillus and most other micro-organisms. Mercury has a specific action against *Treponema pallidum* and is, therefore, largely used in the treatment of primary and secondary syphilis. The development of the disease is aborted if a mercurial ointment, such as a strong calomel ointment, is applied one or two hours after the infection. In tertiary syphilis mercury is less valuable. Syphilis is now, however, rarely treated with mercury alone; it is often used in conjunction with the arsphenamine compounds, bismuth and iodides.

Mercury is also a specific for parasitic skin diseases; for this purpose, one of the oxides or iodides, or the subchloride, is generally employed in the form of an ointment. Mercuric chloride is very easily and rapidly absorbed. This is probably explained by the fact that, although it precipitates protein, the precipitate is readily soluble in an excess of protein, and since the protein is almost always in excess owing to the small amount of mercury likely to be used in practice, solutions of mercuric chloride are almost non-astringent. Owing to its rapid absorption and the rapidity with which it produces specific effects, it is not so suitable for disinfecting the lower alimentary canal as some of the less soluble salts of mercury, such as calomel.

As an antiseptic and disinfectant, a 1 in 1000 solution in water forms a suitable solution for general purposes, but a 1 in 1000 solution in 70 per cent. alcohol is greatly superior. For general surgical purposes, such as irrigation, cleansing of wounds, etc., solutions from 1 in 10,000 to 1 in 100,000 are employed. The latter strength (i.e. 1 in 100,000) is suitable for vaginal injection It should be noted that a solution of mercuric chloride should not be used as a sterilising fluid for steel instruments since a deposit of mercury is formed on them A

dilute solution of mercury oxycyanide may, however, be used for this purpose. In the preparation of solutions for surgical purposes, 5 parts of tartaric acid are sometimes added to each part of mercuric chloride used. This addition is said to render the antiseptic action more effective, probably by lessening, still further, the formation of any insoluble albuminate. Alcoholic solutions of mercuric chloride are sometimes used for sterilising the skin prior to operation; they are said to be less irritant than solutions of iodine. Harrington's solution contains 0·08 part of mercuric chloride, 64 parts of alcohol (90 per cent.), 6 parts of hydrochloric acid and 30 parts of water. The addition of sodium chloride or ammonium chloride to solutions of mercuric chloride is said to increase its antiseptic power. For convenience, solution-tablets (Solvellæ) are prepared. For disinfecting clothes and utensils a 1 in 2000 solution of mercuric chloride is sufficiently strong. As a disinfectant for excreta, a solution of 1 part of mercuric chloride and 25 parts of hydrochloric acid diluted to 500 parts with water is used, especially in cases of typhoid.

For eye lotions, mouth-washes and urethral injections, 1 in 10,000 to 1 in 4500 solutions of mercuric chloride are used. As a parasiticide to destroy pediculi, a solution of 1 in 2000 is of use. Ointments of mercuric chloride (0·5 to 1·5 per cent.) are also employed in parasitic skin diseases. In the preparation of such ointments, the salts must be added in aqueous or glycerin solution. Gauze, wool and lint, medicated with mercuric chloride, are liable to lose their antiseptic properties owing to reduction of the salt by the organic material of the dressing.

Mercuric chloride is **administered** by the mouth as Liquor Hydrargyri Perchloridi, or by intravenous injection of a solution containing 0·002 to 0·004 gramme ($\frac{1}{32}$ to $\frac{1}{16}$ grain) in 5 millilitres (75 minims). Solutions for **injection** may be prepared by aseptic methods.

Liquor Hydrargyri Perchloridi is often dispensed with potassium iodide, in which case red mercuric iodide is formed but passes into solution in the presence of an excess of the potassium salt. Pills may be prepared by carefully triturating the salt with lactose so as to obtain thorough admixture, and massing as desired. When dispensing mercuric chloride, steel implements, such as spatulas, must not be used. Solutions of mercuric chloride for external use should be coloured with methylene blue. Mercuric chloride is **incompatible** with alkalis, lead acetate, silver nitrate, alkaloids (especially when iodides are present) and with vegetable astringents. Solutions made with tap water will yield a slight deposit on standing. In acute mercurial **poisoning**, there is violent gastro-enteritis and diarrhœa, which generally yields to treatment; this is followed in a day or two by stomatitis and all the signs of acute nephritis. If the nephritis is not immediately fatal, symptoms resembling those of phosphorus poisoning may supervene, and death may not occur for several weeks. Chronic mercurial poisoning (mercurialism) is characterised by salivation,

fœtid breath, loosening of the teeth, swollen and ulcerated gums, muscular tremors and paralysis. It is well to remember that albuminuria is common after the therapeutic use of mercurials, and that slightly larger doses may cause nephritis. In cases of acute poisoning, fresh white of egg should be administered as soon as possible, and emetics should be given. Heat should be applied to the body, and stimulants given.

Dose.– 0·002 to 0·004 gramme ($\frac{1}{30}$ to $\frac{1}{16}$ grain).

SAL ALEMBROTH.—Alembroth salt, $(NH_4)_2HgCl_4,H_2O$, may be prepared by mixing hot, strong solutions of mercuric chloride and ammonium chloride, and evaporating the solution. It occurs as a granular powder or in the form of colourless crystals. Sal alembroth is a powerful antiseptic and was used formerly in the preparation of gauze, wool and lint, which were said to retain their strength for a longer period than dressings made with mercuric chloride.

Preparations

Carbasus Hydrargyri Perchloridi, B.P.C.—(Carbas. Hydrarg. Perchlor.)—Mercuric Chloride Gauze. *Syn.*—Sublimate Gauze. It contains about 0·1 per cent of mercuric chloride, but is liable to considerable variation in strength.

Liquor Hydrargyri Perchloridi, B.P.—(Liq. Hydrarg. Perchlor.)—Solution of Mercuric Chloride. An aqueous solution containing 0·1 per cent. w/v of mercuric chloride (limits, 0·095 to 0·105). 4 millilitres contains 0·004 gramme, and 1 fluid drachm contains about $\frac{1}{16}$ grain, of mercuric chloride. It should be stored protected from light. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Solvellæ Hydrargyri Perchloridi, B.P.C.—(Solv. Hydrarg. Perchlor.)—Mercuric Chloride Solution-Tablets. *Syn.*—Antiseptic Perchloride Tablets; Antiseptic Corrosive Sublimate Tablets. Each tablet contains $8\frac{3}{4}$ grains of mercuric chloride with sodium chloride and methylene blue. One tablet dissolved in 20 fluid ounces of water forms a solution containing 1 in 1000 of mercuric chloride.

HYDRARGYRI SALICYLAS

(Hydrarg. Salicyl.)

Mercury Salicylate

Mercury salicylate may be prepared by boiling an aqueous solution of salicylic acid with yellow mercuric oxide. The product is an organo-metallic compound, in which the functions of the mercury are modified so that it is not precipitated by the usual reagents. It occurs as a white or faintly pink, amorphous, tasteless, odourless powder, neutral to litmus. The compound is not affected by weak acids, but is decomposed by strong mineral acids.

Almost **insoluble** in water and organic solvents; soluble in solutions of alkali hydroxides and carbonates and in warm solutions of alkali halides, the cooled solution depositing double salts.

Standard.—Mercury salicylate contains not less than 54 per cent. and not more than 59·6 per cent. of Hg. Residue on gentle ignition

at about 300°, not more than 0·2 per cent. 0·2 gramme dissolves completely in 4 millilitres of N/1 sodium hydroxide. 0·1 gramme shaken with 5 millilitres of hydrogen sulphide solution produces no immediate darkening. 1 gramme, shaken with 30 millilitres of chloroform and filtered, leaves, on evaporation of the filtrate, not more than 0·001 gramme of residue (limit of free salicylic acid).

Assay.—Dissolve about 0·5 gramme, accurately weighed, in 20 millilitres of N/1 sodium hydroxide; acidify with 20 millilitres of acetic acid and add 50 millilitres of N/10 iodine; allow to stand for three hours, and titrate with N/10 sodium thiosulphate; each millilitre of N/10 iodine is equivalent to 0·01003 gramme of Hg.

Action and Uses.—Mercury salicylate is used as an antiseptic and antisyphilitic, in the form of dusting powder and ointment (1 in 100), or is given in pills. For intramuscular injection, a suspension in liquid paraffin (1 in 10) is employed; the dose given hypodermically is sometimes gradually increased to 0·09 gramme (1½ grains). Preparations for **injection** should be made by suspending the mercury salicylate in an oily medium which has been heated at 150° for one hour, and the final containers should be sterilised by tyndallisation. Mercury salicylate is **incompatible** with potassium iodide.

Dose.– 0·003 to 0·02 gramme ($\frac{1}{20}$ to $\frac{1}{3}$ grain).

HYDRARGYRI BENZOAS.—Mercuric benzoate, $(C_6H_5COO)_2Hg,H_2O$, is a white, crystalline salt given in doses of 0·0025 to 0·006 gramme ($\frac{1}{25}$ to $\frac{1}{10}$ grain) by intramuscular injection, or by the mouth, in the treatment of syphilis.

HYDRARGYRI SUCCINIMIDUM.—Mercury succinimide has been given by hypodermic injection in doses of 0·016 gramme ($\frac{1}{4}$ grain) in the treatment of syphilis. The injections are painful and solutions may, therefore, contain a small quantity of a cocaine salt. Solutions of mercury succinimide for injection may be sterilised by heating at 100° for thirty minutes or by tyndallisation.

HYDRARGYRI SUBCHLORIDUM

(Hydrarg. Subchlor.)

Mercurous Chloride

$HgCl = 236·1$

Synonyms—Calomel; Subchloride of Mercury.

Mercurous chloride may be prepared by heating a mixture of mercurous sulphate and sodium chloride, collecting the sublimate, washing it with water until free from mercuric chloride which is always formed during sublimation, and drying. It occurs as a dull, white, heavy powder, becoming yellow when triturated or compressed. When heated, it volatilises at about 383° without previous fusion. Heated with anhydrous sodium carbonate, it is decomposed, giving a sublimate of metallic mercury. It is blackened by contact with alkalis,

owing to the formation of mercurous oxide. Mercurous chloride in a finely divided condition may be prepared by sifting the sublimed variety through a silk sieve, containing not less than 120 meshes per inch, or by precipitation.

Insoluble in water, alcohol (90 per cent.), ether and cold dilute acids.

Standard, B.P.—Mercurous chloride contains not less than 99·6 per cent. of HgCl. Residue on volatilisation, not more than 0·1 per cent. It complies also with a limit test for mercuric chloride, and with a test for absence of ammoniated mercury.

Action and Uses.—Mercurous chloride is practically non-corrosive to the alimentary canal. It is excreted partly unchanged and partly as sulphide in the fæces. In small, repeated doses, it is useful for disinfecting the bowel in the treatment of common bilious attack, especially as its mildly irritant properties produce a slight purgative effect. As a purgative in large doses, when constipation is due to obstruction, mercurous chloride should be used with care, since, if its elimination is delayed, absorption may take place causing toxic symptoms. When given as a purgative, it is advisable to administer mercurous chloride at night, and to give a saline purgative before breakfast the following morning to minimise the possibility of the absorption of the mercurial. Repeated doses of 0·01 gramme ($\frac{1}{6}$ grain) of mercurous chloride are useful in follicular tonsillitis. It has also been used in acute dysentery, often with ipecacuanha, and in cholera and enteric fever. It exerts a marked diuretic action in some cases of cardiac dropsy. As a purgative, mercurous chloride is often combined with colocynth, as in Pilulæ Hydrargyri Subchloridi, Colocynthidis et Hyoscyami and Pilulæ Hydrargyri Subchloridi et Colocynthidis. In the form of ointment, it is used as an anti-pruritic in the treatment of eczema, psoriasis and pruritus ani.

Mercurous chloride is **administered** in the form of powders, tablets and pills. It is said to cause less irritation to the bowel if the dose is combined with 10 grains of sodium bicarbonate.

Like all mercurials, mercurous chloride has an antisyphilitic action. Ointments containing 30 to 50 per cent. of mercurous chloride are used as prophylactics against syphilis, and are said to be effective when applied within four hours of contact. In the form of Injectio Hydrargyri Subchloridi it is used intramuscularly for syphilis; it is very slowly absorbed, and may give rise to pain. Preparations for **injection** should be made by suspending the mercurous chloride in an oily medium which has been heated at 150° for one hour, and the final containers should be sterilised by tyndallisation. Mercurous chloride is **incompatible** with alkali chlorides, bromides and iodides, hydroxides and soaps. Mucilage of acacia or tragacanth must not be used with it, since a cement-like substance is produced.

Dose.—0·03 to 0·2 gramme ($\frac{1}{2}$ to 3 grains), 0·03 to 0·06 gramme ($\frac{1}{2}$ to 1 grain), by intramuscular injection.

Preparations

Injectio Hydrargyri Subchloridi, B.P.—(Inj. Hydrarg. Subchlor.)—Injection of Mercurous Chloride. *Syn.*—Calomel Injection. A sterile preparation containing mercurous chloride, about 5 per cent. w/v, with sterilised wool fat, camphor, creosote and sterilised olive oil. 1·2 millilitres contains about 0·06 gramme, and 20 minims contains about 1 grain, of mercurous chloride. Dose.– 0·6 to 1·2 millilitres (10 to 20 minims), by intramuscular injection

An injection prepared with japan wax and almond oil, in place of wool fat and olive oil, was included in the British Pharmaceutical Codex 1923.

Lotio Hydrargyri Nigra, B.P.—(Lot. Hydrarg. Nig.)—Black Mercurial Lotion. *Syn.*—Black Wash. It contains mercurous oxide equivalent to 0·7 per cent. w/v of mercurous chloride, with glycerin and solution of calcium hydroxide.

Pilulæ Hydrargyri Subchloridi, Colocynthidis et Hyoscyami, B.P.C.—(Pil. Hydrarg. Subchlor. Colocynth. et Hyoscy.)—Mercurous Chloride, Colocynth and Hyoscyamus Pills. *Syn.*—Calomel, Colocynth and Hyoscyamus Pills; Zittmann's Pills. Each pill contains 1 grain of mercurous chloride, 2½ grains of compound extract of colocynth and 1 grain of dry extract of hyoscyamus. Dose.– 1 or 2 pills.

Pilulæ Hydrargyri Subchloridi Compositæ, B.P.C.—(Pil. Hydrarg. Subchlor. Co.)—Compound Mercurous Chloride Pills. *Syn.*—Compound Calomel Pills; Plummer's Pill. Each pill contains 1 grain of mercurous chloride, 1 grain of sulphurated antimony and 2 grains of guaiacum resin. Dose.– 1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914, *under the name of Pilula Hydrargyri Subchloridi Composita.*

Pilulæ Hydrargyri Subchloridi et Colocynthidis, B.P.C.—(Pil. Hydrarg. Subchlor. et Colocynth.)—Mercurous Chloride and Colocynth Pills. *Syn.*—Calomel and Colocynth Pills. Each pill contains 1 grain of mercurous chloride and 4 grains of compound extract of colocynth. Dose.– 1 pill.

Pilulæ Podophyllini Compositæ, B.P.C.—(Pil. Podoph. Co.)—Compound Podophyllin Pills. Each pill contains ¼ grain of resin of podophyllum, 1 grain of mercurous chloride and ⅛ grain of dry extract of belladonna. Dose.– 1 pill.

Unguentum Hydrargyri Subchloridi Compositum, B.P.C.—(Ung. Hydrarg. Subchlor. Co.)—Compound Mercurous Chloride Ointment. *Syn.*—Calomel Cream; Prophylactic Ointment. Mercurous chloride, 25 per cent., and mercuric oxycyanide, 0·075 per cent., in wool fat, yellow soft paraffin and liquid paraffin.

Unguentum Hydrargyri Subchloridi, B.P.—(Ung. Hydrarg. Subchlor.)—Ointment of Mercurous Chloride. *Syn.*—Mercurous Chloride Ointment; Calomel Ointment. Mercurous chloride, 20 per cent., in simple ointment.

HYDRARGYRI SULPHIDUM RUBRUM

(Hydrarg. Sulphid. Rub.)

Red Mercuric Sulphide

HgS = 232·7

Synonyms—Cinnabar; Vermilion; Chinese Red.

Red mercuric sulphide is found naturally in large quantities. Commercially, however, it is usually prepared either by subliming a mixture of mercury and sulphur, powdering the sublimate and elutriating, or by the wet process, that is, by triturating mercury and

sulphur until black, adding solution of potassium hydroxide, and heating the mixture. The former method is more commonly used. Red mercuric sulphide occurs as a brilliant, scarlet-red, heavy powder, very soft to the touch, and without taste or odour. Exposure to light gradually destroys the bright colour. Heated in a test-tube, it becomes nearly black, yielding metallic mercury and sulphur dioxide and, if pure, volatilising without residue. The finer qualities of vermilion are said to owe their superiority of shade to the care used in subliming. It is unaffected by the dilute mineral acids and acetic acid, but is appreciably soluble in hot concentrated hydrochloric acid. Hot nitric acid decomposes it, precipitating a portion of the sulphur; nitro-hydrochloric acid dissolves it, with decomposition; alkaline liquids have no effect.

Insoluble in water and alcohol.

Action and Uses.—Red mercuric sulphide is occasionally used in the form of ointment (1 or 2 per cent.) as an antiseptic in chronic skin diseases

HYDRARGYRI PERSULPHAS.—Hydrargyri Sulphas Albus, or mercuric sulphate, $HgSO_4$, may be obtained by boiling mercury in excess of strong sulphuric acid, with or without the addition of nitric acid, and, carefully, with constant stirring, continuing the heating until the crystalline powder becomes perfectly dry and white. It occurs as a heavy, white, crystalline powder.

HYDRARGYRI SUBSULPHAS FLAVUS.—Turpeth mineral, or mercury oxysulphate, $HgSO_4,2HgO$, is obtained from mercuric sulphate by trituration with water. It occurs as a heavy, yellow powder. It was formerly used as an ointment for ringworm and seborrhœa capitis.

HYDRARGYRI SUBSULPHIDUM NIGRUM.—Ethiop's mineral, Hydrargyri Sulphuretum Nigrum, Hydrargyrum cum Sulphure, Hydrargyri Sulphuretum cum Sulphure, or black mercuric sulphide, occurs as a heavy, black or greyish-black, amorphous powder. It possesses little or no medicinal activity.

HYDRARGYRI TANNAS

(Hydrarg. Tann.)

Mercurous Tannate

Synonym—Mercury Tannate.

Mercurous tannate may be prepared by triturating 50 parts of freshly prepared and oxide-free mercurous nitrate with 30 parts of tannic acid and 50 parts of distilled water until a perfectly uniform paste is obtained; a large volume of water is then added, decanted, and the greenish precipitate repeatedly washed with cold water until free from nitric acid, collected, pressed, and dried between 36° and 40° Mercurous tannate occurs as a dull brownish-green powder, or in scales, without taste or odour, containing usually from 40 to 50 per cent. of mercury. Very dilute hydrochloric acid does not alter it perceptibly, but concentrated hydrochloric acid, especially in the presence

of alcohol, converts it into mercuric chloride, tannic acid remaining in solution. Caustic alkalis and alkali carbonates produce a separation of metallic mercury in a very fine granular state, while the alkaline tannic acid solution, owing to oxidation, assumes a brown colour It should be **stored** in well-closed, amber-coloured bottles

Insoluble in water.

Action and Uses.—Mercurous tannate has been used in syphilis, and produces a mild mercurial action without derangement of digestion or unpleasant after-effects. It may be **administered** in pills or tablets. A small dose of powdered opium is added, if necessary, to prevent diarrhœa.

Dose.– 0·06 to 0·12 gramme (1 to 2 grains).

HYDRARGYRUM

(Hydrarg.)

Mercury

Hg = 200·6

Synonym—Quicksilver.

Mercury is obtained chiefly from cinnabar, an impure sulphide found in China, Spain, Austria and California. The mercury is extracted by roasting, when the sulphur is converted into sulphur dioxide and the mercury volatilises and is condensed in suitable receivers; it is also obtained by distillation with lime. It occurs as a heavy, shining, silvery-white, very mobile liquid, easily divisible into globules. The specific gravity is about 13·5. When heated, it readily volatilises and boils at about 358° It solidifies on cooling to about —39·5°, forming a ductile malleable mass. Impure mercury leaves a track when poured over a clean glass plate; mechanical impurities may be removed by squeezing it through chamois leather. Mercury is insoluble in hydrochloric acid, but dissolves in nitric acid and in hot sulphuric acid, forming solutions of mercuric and mercurous salts. It may be reduced to a very fine state of division by trituration with various substances such as chalk or grease. It unites with many other metals to form amalgams.

Insoluble in water and alcohol.

Standard, B.P.—Mercury contains not less than 99·5 per cent. of Hg. Residue on volatilisation at about 300°, not more than 0·02 per cent.

Action and Uses.—Mercury, in a finely divided state, is absorbed either through the skin or from the alimentary tract, producing the effects described under Hydrargyri Perchloridum. As a purgative, mercury is **administered** by the mouth in the form of Pilula Hydrargyri or

Pilulæ Hydrargyri cum Rheo. Hydrargyrum cum Creta is also used as a mild purgative, especially for children, and as an antiseptic in the alimentary canal; it is administered in powders or cachets, usually mixed with an equal weight of lactose, or with rhubarb and sodium bicarbonate, and in pills or tablets. Pills are prepared by massing gently with syrup of liquid glucose, adding powdered liquorice to increase their size if necessary. It should be rubbed lightly in mixing with other powders, or the mercury may separate. Mercury and chalk powders should not be kept too long in wrapped form on account of oxidation and loss of mercury.

In the treatment of syphilis, mercury may be administered orally as Pilulæ Hydrargyri cum Creta et Opii, and may be injected intramuscularly in the form of Injectio Hydrargyri or Injectio Hydrargyri Fortis. Preparations for **injection** should be made by suspending the mercury in an oily medium which has been heated at 150° for one hour, an antiseptic such as phenol being added. **Externally,** Unguentum Hydrargyri (30 to 60 grains daily) may be administered by inunction for syphilis. In the treatment of chronic synovitis and enlarged joints, Unguentum Hydrargyri Compositum is employed. Unguentum Hydrargyri Nitratis Forte is applied as an antiseptic in chronic skin diseases, such as eczema and psoriasis. It is, however, usually found to be too irritating for general use, and the weaker Unguentum Hydrargyri Nitratis Dilutum is preferred. Liquor Hydrargyri Nitratis Acidus is a strongly corrosive liquid, and is used as a caustic for syphilitic warts, ulcers, lupus patches, etc. It should be carefully applied by means of a glass rod.

Doses.– 0·03 to 0·2 gramme (½ to 3 grains), by the mouth; 0·03 to 0·06 gramme (½ to 1 grain), by intramuscular injection.

Preparations

Emplastrum Hydrargyri, B.P.C.—(Emp. Hydrarg.)—Mercurial Plaster. Mercury, about 1 in 3, with olive oil, sublimed sulphur and plaster of lead.

This plaster was included in the British Pharmacopœia, 1914.

Hydrargyrum cum Creta, B.P.—(Hydrarg. c. Cret.)—Mercury with Chalk. *Syn.*—Grey Powder. Mercury, 33 per cent. (limits, 31 to 35), with chalk. It should be stored in well-closed bottles in a cool place. Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

Injectio Hydrargyri, B.P.—(Inj. Hydrarg.)—Injection of Mercury. *Syn.*—Mercurial Cream. A sterile preparation containing mercury, about 10 per cent. w/v, wool fat, camphor, creosote and sterilised olive oil. 0·6 millilitre contains about 0·06 gramme, and 10 minims contains about 1 grain, of mercury. Dose.– 0·3 to 0·6 millilitre (5 to 10 minims), by intramuscular injection.

An injection, prepared with japan wax and almond oil in place of wool fat and olive oil, and containing slightly larger proportions of camphor and creosote, was included in the British Pharmaceutical Codex, 1923, under the name of Injectio Mercurialis.

Injectio Hydrargyri Fortis, B.P.C.—(Inj. Hydrarg. Fort.)—Strong Injection of Mercury. *Syn.*—Oleum Cinereum; Grey Oil. It contains 40 per cent. w/v of mercury. Dose.– 0·06 to 0·12 millilitre (1 to 2 minims), by intramuscular injection.

Linimentum Hydrargyri, B.P.C.—(Lin. Hydrarg.)—Liniment of Mercury. Ointment of mercury, about 30 per cent. w/v, equivalent to about 9 per cent. w/v of metallic mercury, with dilute solution of ammonia and liniment of camphor.

This liniment was included in the British Pharmacopœia, 1914.

Liquor Hydrargyri Nitratis Acidus, B.P.C.—(Liq. Hydrarg. Nit. Acid.)—Acid Solution of Mercuric Nitrate. A solution of mercury in nitric acid, containing the equivalent of 1 in 3 by weight of mercury.

This solution was included in the British Pharmacopœia, **1914.**

Pigmentum Hydrargyri Nitratis, B.P.C.—(Pig. Hydrarg. Nit.) Mercuric Nitrate Paint. *Syn.*—Guttæ Hydrargyri Nitratis; Mercuric Nitrate Drops. Dilute ointment of mercuric nitrate, 1 in 16, in arachis oil.

Pigmentum Hydrargyri Nitratis cum Menthole, B.P.C.—(Pig. Hydrarg. Nit. c. Menthol.)—Mercuric Nitrate Paint with Menthol. Dilute ointment of mercuric nitrate, 1 in 16, and menthol, 1 in 100, in arachis oil.

Pilula Hydrargyri, B.P.—(Pil. Hydrarg.)—Pill of Mercury. *Syn.*—Mercury Pill; Blue Pill. Mercury, 33 per cent. (limits, 32 to 34), with syrup, liquid glucose, glycerin and liquorice. Dose.– 0·25 to 0·5 gramme (4 to 8 grains).

Pilulæ Colchici et Hydrargyri, B.P.C.—(Pil. Colch. et Hydrarg.)—Colchicum and Mercury Pills. Each pill contains $\frac{1}{8}$ grain of dry extract of colchicum, $\frac{1}{3}$ grain of pill of mercury and $\frac{1}{2}$ grain of compound extract of colocynth. Dose.– 1 to 3 pills.

Pilulæ Colchici et Hydrargyri Compositæ, B.P.C.—(Pil. Colch. et Hydrarg. Co.)—Compound Colchicum and Mercury Pills. *Syn.*—Brodie's Gout Pills. Each pill contains $\frac{1}{2}$ grain of dry extract of colchicum and $1\frac{1}{2}$ grains each of pill of mercury, compound extract of colocynth and extract of rhubarb. Dose.– 1 or 2 pills.

Pilulæ Colocynthidis et Hydrargyri, B.P.C.—(Pil. Colocynth. et Hydrarg.)—Colocynth and Mercury Pills. Each pill contains 2 grains of compound extract of colocynth and 3 grains of pill of mercury. Dose.– 1 or 2 pills.

Pilulæ Colocynthidis et Hydrargyri Compositæ, B.P.C.—(Pil. Colocynth. et Hydrarg. Co.)—Compound Colocynth and Mercury Pills. Each pill contains $\frac{3}{4}$ grain of pill of colocynth and hyoscyamus and $\frac{1}{4}$ grain of pill of mercury. Dose.– 1 to 4 pills.

Pilulæ Digitalis Compositæ, B.P.C.—(Pil. Digit. Co.)—Compound Digitalis Pills. *Syn.*—Pilulæ Digitalis cum Scilla; Guy's Pills; Niemeyer's Pills. Each pill contains 1 grain each of powdered digitalis, squill, and pill of mercury. Dose.– 1 or 2 pills.

Pilulæ Hydrargyri cum Creta et Opii, B.P.C.—(Pil. Hydrarg. c. Cret. et Opii)—Mercury with Chalk and Opium Pills. *Syn.*—Hutchinson's Pills. Each pill contains 1 grain of mercury with chalk and 1 grain of powder of ipecacuanha and opium. Dose.– 1 pill.

Pilulæ Hydrargyri cum Rheo, B.P.C.—(Pil. Hydrarg. c. Rheo)—Mercury Pills with Rhubarb. Each pill contains $2\frac{1}{2}$ grains of pill of mercury and $2\frac{1}{2}$ grains of compound pill of rhubarb. Dose.– 1 pill.

Unguentum Hydrargyri, B.P.—(Ung. Hydrarg.)—Ointment of Mercury *Syn.*—Mercury Ointment; Unguentum hydrargyri I.A. Mercury, 30 per cent. (limits, 29 to 31), in suet and benzoinated lard.

Unguentum Hydrargyri Compositum, B.P.—(Ung. Hydrarg. Co.)—Compound Ointment of Mercury. *Syn.*—Compound Mercury Ointment; Scott's Dressing. Mercury ointment, 40 per cent., with yellow beeswax, olive oil and camphor. It contains 12 per cent. of mercury (limits, 11·5 to 12·5).

Unguentum Hydrargyri, Plumbi et Zinci, B.P.C.—(Ung. Hydrarg. Plumb. et Zinc.)—Mercury, Lead and Zinc Ointment. *Syn.*—Unguentum Metallorum. Ointment of mercuric nitrate, ointment of lead subacetate and ointment of zinc oxide, equal parts.

Unguentum Hydrargyri Nitratis Dilutum, B.P.—(Ung. Hydrarg. Nit. Dil.)—Dilute Ointment of Mercuric Nitrate. *Syn.*—Diluted Mercuric Nitrate Ointment. Strong ointment of mercuric nitrate, 20 per cent., in yellow soft paraffin.

Unguentum Hydrargyri Nitratis Forte, B.P.—(Ung. Hydrarg. Nit. Fort.)—Strong Ointment of Mercuric Nitrate. *Syn.*—Unguentum Hydrargyri Nitratis; Mercuric Nitrate Ointment. A solution of mercury in nitric acid added to a mixture of olive oil and lard heated at 150°. It contains not less than the equivalent of 6·7 per cent. of Hg.

Unguentum Mercuriale, B.P.C.—(Ung. Mercur.)—Mercurial Ointment. *Syn.*—Unguentum Hydrargyri Mite; Blue Ointment; Trooper's Ointment. Ointment of mercury, 33·3 per cent., with lard.

HYDRARGYRUM AMMONIATUM

(Hydrarg. Ammon.)

Ammoniated Mercury

$NH_2HgCl = 252·1$

Synonyms—White Precipitate; Mercuric-Ammonium Chloride.

Ammoniated mercury may be prepared by dissolving 60 parts of mercuric chloride in 1200 parts of distilled water and pouring the solution, with constant stirring, into 80 parts of dilute solution of ammonia diluted with 400 parts of distilled water; the resulting precipitate is washed with cold water until the washings are nearly free from chloride, and dried at a low temperature. It occurs as a white, odourless powder with an earthy, somewhat metallic taste, and is stable in air. It is slowly decomposed by cold water, rapidly by boiling water, a yellow basic salt of the composition, NH_2HgCl,HgO, being formed. Warmed with sodium hydroxide solution, ammonia is evolved and yellow mercuric oxide produced. When strongly heated, it is decomposed and volatilised without previous fusion. It dissolves in hot solutions of ammonium salts, and in a cold concentrated solution of sodium thiosulphate with evolution of ammonia. Ammoniated mercury should be **stored** protected from light.

Insoluble in water, alcohol and ether; soluble in warm hydrochloric, nitric and acetic acids

Standard, B.P.—Ammoniated mercury contains not less than 97 per cent. and not more than the equivalent of 100·5 per cent. of NH_2HgCl. Residue on ignition at a low red heat, not more than 0·2 per cent. It complies also with a limit test for mercurous chloride and for carbonate.

Action and Uses.—Ammoniated mercury is more irritating than the oxides of mercury, and is not given internally. It is used, principally in the form of Unguentum Hydrargyri Ammoniati and of Unguentum Hydrargyri Ammoniati Dilutum, to destroy pediculi and as an application to the skin in eczema, impetigo, herpes, scabies and other parasitic skin diseases.

Preparations

Unguentum Hydrargyri Ammoniati, B.P.—(Ung. Hydrarg. Ammon.)—Ointment of Ammoniated Mercury. *Syn.*—Ammoniated Mercury Ointment, White Precipitate Ointment. Ammoniated mercury, 5 per cent., in simple ointment.

Unguentum Hydrargyri Ammoniati Dilutum, B.P.C.—(Ung. Hydrarg. Ammon. Dil.)—Dilute Ammoniated Mercury Ointment. Ointment of ammoniated mercury and simple ointment, equal parts.

Unguentum Hydrargyri Ammoniati et Zinci Oxidi, B.P.C.—(Ung. Hydrarg. Ammon. et Zinc. Oxid.)—Ammoniated Mercury and Zinc Oxide Ointment. Ointment of ammoniated mercury and ointment of zinc oxide, equal parts.

HYDRARGYRUM OLEATUM

(Hydrarg. Oleat.)

Oleated Mercury

Oleated mercury is prepared, as described in the British Pharmacopœia, by triturating yellow mercuric oxide with liquid paraffin, and heating the mixture at 50° with oleic acid until combination is effected. It occurs as a greyish mass of ointment-like consistence.

Standard, B.P.—Oleated mercury contains the equivalent of not less than 19 per cent. and not more than 21 per cent. of yellow mercuric oxide.

Action and Uses.—Oleated mercury is used almost entirely in the form of Unguentum Hydrargyri Oleati for application to syphilitic lesions, ringworm, enlarged glands and inflamed joints, for the destruction of pediculi, and as a stimulating antiseptic in eczema and other chronic skin diseases. The ointment is sometimes used in the treatment of syphilis by inunction, but is more irritating than Unguentum Hydrargyri, over which it possesses no advantages.

Preparation

Unguentum Hydrargyri Oleati, B.P.—(Ung. Hydrarg. Oleat.)—Ointment of Oleated Mercury. *Syn.*—Mercuric Oleate Ointment. Oleated mercury, 25 per cent., in simple ointment.

HYDRASTINÆ HYDROCHLORIDUM

(Hydrastin. Hydrochlor.)

Hydrastine Hydrochloride

$C_{21}H_{21}O_6N,HCl = 419{\cdot}6$

Hydrastine hydrochloride is the hydrochloride of the alkaloid hydrastine obtained from the rhizome and roots of *Hydrastis canadensis*

Linn. It occurs as a white or creamy white, odourless and hygroscopic powder, having a very bitter, pungent taste. With sulphuric acid, a yellow colour is produced which becomes purple on heating. Sulphuric acid with a trace of molybdic acid gives a green colour, changing to olive-green and then brown. Nitric acid produces a reddish-yellow colouration. Sulphuric acid with a trace of potassium dichromate yields a red colour, changing to brown, and with a trace of selenious acid gives a light green colour, changing to brown. It should be **stored** in well-stoppered bottles and protected from light.

Soluble in water and alcohol; slightly soluble in chloroform; very slightly soluble in ether

Standard.—Hydrastine hydrochloride loses, on drying at 100°, not more than 6 per cent. of its weight. Ash, not more than 0·1 per cent. No blue fluorescence is produced when 0·1 gramme is dissolved in 10 millilitres of dilute sulphuric acid (limit of hydrastinine), but a blue fluorescence appears on the addition of a few drops of potassium permanganate solution. A solution of 0·1 gramme in 2 millilitres of water is not reddened on the addition of chlorine solution (limit of berberine).

Action and Uses.—Hydrastine hydrochloride resembles narcotine in some respects in its physiological action. Its effects are exerted mainly through the central nervous system, especially exciting the medulla, the most important results being to produce a rise of blood pressure through constriction of small vessels, to depress the heart and slow the heart beat. Hydrastine is used to contract the uterus, and to arrest hæmorrhage by producing constriction of peripheral vessels, but its effect on the uterus is very doubtful. A 10 per cent. w/v aqueous solution may be given hypodermically, in doses of 0·3 to 0·6 millilitre (5 to 10 minims). Solutions for **injection** may be sterilised by heating at 100° for thirty minutes, by tyndallisation, or by filtration. The containers should comply with the tests for limit of alkalinity of glass, and the solution should be stored protected from light.

Dose.– 0·016 to 0·06 gramme (¼ to 1 grain)

HYDRASTINA.—Hydrastine, $C_{21}H_{21}O_6N$, occurs as white, glistening prisms, having a very bitter and pungent taste, and melting at about 132°. It gives an alkaline reaction with litmus. Hydrastine is closely related to narcotine, and when oxidised the two substances yield respectively hydrastinine and cotarnine, opianic acid being split off in each case. It gives a yellow colour with sulphuric acid, becoming purple on heating. In the presence of a trace of molybdic acid, sulphuric acid gives a green colour changing to brown. It may be distinguished from hydrastinine by the absence of a blue fluorescence when 1 part is dissolved in 100 parts of dilute sulphuric acid. It is soluble in alcohol (1 in 120), ether (1 in 83), chloroform (1 in 2), and benzene; insoluble in light petroleum and water. Care must be taken not to confuse hydrastine with the extract known as hydrastin. Hydrastine has a similar action to the hydrochloride but, on account of its insolubility, is seldom used. It may be administered in pill form with extract of ergot or hamamelis. Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

HYDRASTININÆ HYDROCHLORIDUM

(Hydrastinin. Hydrochlor.)

Hydrastinine Hydrochloride

$C_{11}H_{12}O_2NCl = 223{\cdot}5$

Synonym—Hydrastinine Chloride.

Hydrastinine hydrochloride is a salt of the alkaloid hydrastinine, which is produced by the oxidation of hydrastine. It occurs in the form of pale yellow, needle-shaped crystals, or as a yellowish-white, crystalline powder, without odour and with a very bitter taste. It melts at about 210°. The strong aqueous solution is pale yellow in colour, and has a blue fluorescence, which becomes more pronounced on further dilution with water; it is optically inactive and is neutral to litmus. Potassium dichromate solution produces a yellow precipitate, which dissolves on heating, but separates again on cooling in yellowish-red, needle-shaped crystals.

Very **soluble** in water and alcohol (1 in 3); sparingly soluble in chloroform, and still less soluble in ether.

Standard.—Hydrastinine hydrochloride leaves not more than 0·1 per cent. of ash. No turbidity is produced on the addition of dilute solution of ammonia to an aqueous solution (1 in 20) (limit of foreign alkaloids), and on the addition of bromine solution to a solution (1 in 20) a yellow precipitate, completely soluble in dilute solution of ammonia, is produced (limit of hydrastine). The addition of 2 to 2·5 millilitres of sodium hydroxide solution to a solution of 0·1 gramme of hydrastinine hydrochloride in 3 millilitres of water produces a white turbidity which, on shaking, entirely disappears; on prolonged shaking or stirring of this solution, or on standing for some time, white crystals of hydrastinine separate, the supernatant liquid remaining clear and almost free from yellow colour (limit of foreign alkaloids).

Action and Uses.—Hydrastinine hydrochloride slows and strengthens the heart's action by direct effect on the muscle. The arterioles are constricted with resulting increase of blood pressure. The most important action, however, is on the uterus, which increases in tone and contracts rhythmically under its influence. It is used to check excessive menstrual loss, but is of little value in post-partum hæmorrhage and is inferior to ergot. Hydrastinine applied to the eye causes dilatation of the pupil. The salt is employed hypodermically in 10 per cent. w/v aqueous solution, in doses of 0·016 to 0·03 gramme (¼ to ½ grain).

Dose.—0·016 to 0·03 gramme (¼ to ½ grain), increased to 0·06 gramme (1 grain).

HYDRASTININA.—Hydrastinine, $C_{11}H_{13}O_3N$, is obtained by the oxidation of hydrastine in acid solution and purified by recrystallisation from benzene or ethyl acetate. It forms white or faintly yellowish, acicular crystals, having an intensely bitter taste. Melting-point, 116° to 117°. An aqueous solution of hydrastinine is strongly alkaline. It is precipitated from its solution in acids by potassium

hydroxide solution, but not by ammonia or sodium carbonate. Nessler's reagent is instantly reduced by it, with formation of a black precipitate of mercury. This test is said to distinguish it from nearly all other alkaloids. It is readily soluble in alcohol, ether and chloroform, but not in cold water, although moderately soluble in hot water. Dose.– 0·016 to 0·03 gramme (¼ to ½ grain), increased to 0·06 gramme (1 grain).

HYDRASTIS
(Hydrast.)

Hydrastis

Synonyms—Golden Seal; Yellow Root; Hydrastis Rhizome; Hydrastis rhizoma I.A.

Hydrastis consists of the dried rhizome and roots of *Hydrastis canadensis* Linn. (Fam. Ranunculaceæ), a small perennial plant, growing in Canada and the Eastern United States; it is collected in the autumn.

The rhizome is small, yellowish-brown and tortuous, from 1 to 6 centimetres long and from 3 to 12 millimetres thick, wrinkled longitudinally and marked by encircling scale-leaf scars. It bears frequent, short, upright branches terminated by cup-shaped scars left by the aerial stems. All parts of the surface bear numerous brittle, curved, wiry roots, which often become partly or wholly broken off, leaving short protuberances or circular, yellow scars. The rhizome is hard, and breaks with a resinous fracture. The transversely cut surface varies in colour from dark yellow to dark yellowish-brown, and exhibits a comparatively thick bark and a ring of about 12 to 20 bright yellow, somewhat distant, narrow, wood bundles surrounding a large pith. The freshly broken surface gives a characteristic bright yellow fluorescence in ultra-violet light. The odour is distinct and disagreeable, and the taste is bitter.

The diagnostic **microscopical** characters are the parenchymatous ground tissue containing numerous starch grains up to 15 microns in diameter, and both simple and compound with 2 to 6 components; the small, lignified, pitted vessels and fibres of the xylem; the brown, tabular-celled cork; the absence of calcium oxalate and of stone cells.

Hydrastis **contains** the alkaloids hydrastine, berberine and canadine. Hydrastine is present to the extent of about 2 per cent., and berberine to the extent of about 2·5 per cent.

Standard.—Hydrastis contains not more than 2 per cent. of foreign organic matter. Acid-insoluble ash, not more than 3 per cent.

Hydrastis, in powder (Pulvis Hydrastis : Pulv. Hydrast.), contains the constituents and possesses the diagnostic microscopical characters of Hydrastis, and complies with the limit for acid-insoluble ash of the unground drug. Pulvis Hydrastidis I.A. contains not less than 2 per cent. of hydrastine.

Action and Uses.—Hydrastis has been used as a simple bitter, presumably because of the large quantity of berberine which it contains. It is used to control excessive uterine hæmorrhage, but its alkaloid, hydrastine, is less useful than hydrastinine in this respect. In post-partum hæmorrhage it is of little value, and is inferior to ergot. It is used in inflammations of the uterine mucosa and in leucorrhœa. Hydrastis is administered in the form of tincture, extract and liquid extract.

Preparations

Elixir Viburni et Hydrastis, B.P.C.—(Elix. Viburn. et Hydrast.)—Elixir of Black Haw and Hydrastis. *Syn.*—Elixir Viburni Compositum; Compound Elixir of Viburnum Prunifolium. Liquid extract of black haw, 1 in 2, and extract of hydrastis, about 1 in 6, with oils of coriander and caraway, and glycerin. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Extractum Hydrastis, B.P.C.—(Ext. Hydrast.)—Extract of Hydrastis. *Syn.*—Hydrastin; Extractum Hydrastis Siccum. A dry alcoholic extract containing from 7·5 to 8·5 per cent. of hydrastine; 0·12 gramme contains about 0·01 gramme, and 2 grains contains about ⅛ grain, of hydrastine. Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

Extractum Hydrastis Liquidum, B.P.C.—(Ext. Hydrast. Liq.)—Liquid Extract of Hydrastis. *Syn.*—Extractum Hydrastidis fluidum I.A. An alcoholic extract containing from 1·9 per cent. to 2·1 per cent. of hydrastine; 1 millilitre contains about 0·02 gramme, and 15 minims contains about $\frac{3}{11}$ grain, of hydrastine. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This liquid extract was included in the British Pharmacopœia, 1914.

Tinctura Hydrastis, B.P.C.—(Tinct. Hydrast.)—Tincture of Hydrastis *Syn.*—Tinctura Hydrastidis I.A. Liquid extract of hydrastis, 1 in 10. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm)

This tincture was included in the British Pharmacopœia, 1914.

HYOSCINÆ HYDROBROMIDUM

(Hyoscin. Hydrobrom.)

Hyoscine Hydrobromide

$C_{17}H_{21}O_4N,HBr,3H_2O = 438·1$

Synonym—Scopolamine Hydrobromide.

Hyoscine hydrobromide is the hydrobromide of an alkaloid *l*-hyoscine, or *l*-scopolamine, obtained from various solanaceous plants, particularly species of *Datura* and *Scopola* It occurs in colourless, odourless, transparent crystals with a somewhat bitter, acrid taste. The aqueous solution is neutral or slightly acid to litmus. When a trace of hyoscine hydrobromide is moistened with a few drops of nitric acid, and evaporated to dryness on a water-bath, the residue gives a violet colouration on the addition of alcoholic potassium hydroxide solution. This reaction, which is given also by atropine and hyoscyamine, is masked by the presence of other alkaloids. The alkaloidal base, obtained by extracting the ammoniacal solution with

chloroform, is an oily liquid; when dissolved in hydrochloric acid and a solution of auric chloride added, the yellow gold chloride compound is precipitated in micro-crystals of characteristic form and, when recrystallised from water, it has a melting-point of 198° to 200°. Hyoscine hydrobromide should be **stored** in well-closed containers, in a cool place and protected from light.

Soluble in water (about 1 in 2) and alcohol (90 per cent.) (1 in 13); almost insoluble in chloroform and ether.

Standard, B.P.—Hyoscine hydrobromide, after drying at 100°, has a melting-point of 194° to 196°. Specific rotation, determined on a 5 per cent. w/v aqueous solution of the anhydrous salt, −24° to −26°. Loss, on drying at 100°, not less than 12 per cent. and not more than 13 per cent. Ash, not more than 0·1 per cent. No turbidity is produced on adding solution of ammonia to the aqueous solution, and it complies with a test for absence of other alkaloids, and with a limit test for readily carbonisable substances.

Action and Uses.—The effect of hyoscine in paralysing the parasympathetic nerve endings resembles that of atropine, except that it passes off more rapidly. Hyoscine does not produce the stimulating effect of atropine upon the brain; depression of the motor area is immediate and pronounced. Hyoscine is, therefore, much used as a hypnotic, especially in mania and in cerebral excitement, such as occurs in alcoholism. As a rule, hyoscine produces a sensation of fatigue and drowsiness, which is quickly followed by sleep. In some cases, however, a short stage of excitement and motor unrest precedes sleep, especially if large doses are given. The respiratory centre is not stimulated as by atropine, and collapse has been observed. Hyoscine is much less reliable as a hypnotic than morphine or chloral hydrate. It is most effective when sleep is prevented by motor excitement. The action of hyoscine on the peripheral nerve endings is twice as strong as that of the optically inactive variety; both isomerides act similarly upon the central nervous system.

Hyoscine hydrobromide produces mydriasis and loss of accommodation more quickly, but for a shorter time, than atropine. It is used in 1 per cent. solution or as Oculentum Hyoscinæ. As a sedative it is generally **administered** hypodermically, but a solution in chloroform water may be taken by the mouth in chorea and asthma. Its use has been recommended in the treatment of morphine and alcohol addicts, the patient being brought fully under the action of the drug by hypodermic doses of 0·0006 gramme ($\frac{1}{100}$ grain), repeated if necessary. The use of hyoscine hydrobromide ($\frac{1}{100}$ grain) with morphine hydrochloride ($\frac{1}{8}$ grain) by hypodermic injection has been recommended previous to operation, when a smaller quantity of general anæsthetic is required and less pain is felt upon recovery of consciousness.

Hyoscine is also used to produce partial anæsthesia in labour; the method which is known as "twilight sleep" depends upon the administration of hyoscine with morphine and the exclusion of all external

disturbing factors. The initial dose of hyoscine hydrobromide is $\frac{1}{150}$ grain with $\frac{1}{6}$ to $\frac{1}{4}$ grain of morphine sulphate. Subsequent injections contain smaller doses of hyoscine and no morphine. Solutions of hyoscine hydrobromide for **injection** are sterilised by tyndallisation or by filtration, and the containers must comply with the tests for limit of alkalinity of glass. In cases of **poisoning** by hyoscine taken by the mouth, the stomach pump should be used, or an emetic given, followed by hot coffee or stimulants. Inhalation of oxygen with 10 per cent. of carbon dioxide and artificial respiration may be necessary.

Dose.– 0·0003 to 0·0006 gramme ($\frac{1}{200}$ to $\frac{1}{100}$ grain).

Preparations

Nebula Hyoscinæ Composita, B.P.C.—(Neb. Hyoscin. Co.)—Compound Hyoscine Spray. Hyoscine hydrobromide, 0·057 per cent. w/v, cocaine hydrochloride, about 0·9 per cent. w/v, atropine sulphate, about 0·1 per cent. w/v, and sodium nitrite, 12·5 per cent. w/v, in glycerin and distilled water, coloured with solution of bordeaux B.

Oculentum Hyoscinæ, B.P.—(Oculent. Hyoscin.)—Hyoscine Ointment for the Eye. Hyoscine hydrobromide, 0·125 per cent., in simple eye ointment. It should be stored in small, well-closed containers in a cool place and protected from light.

HYOSCYAMI SEMEN

(Hyoscy. Sem.)

Hyoscyamus Seed

Synonym—Henbane Seed.

Hyoscyamus seed consists of the seeds of *Hyoscyamus niger* Linn. (Fam. Solanaceæ), a herb distributed throughout Europe and extending to Persia and India; it is cultivated for medicinal purposes in England.

The seeds are dark brownish-grey, flattened and sub-reniform, with a slight projection at one point, near to which the hilum is situated, about 1 to 1·2 millimetres in width and 1·5 to 1·75 millimetres long. The surface is covered with small, regular, distinct, raised reticulations about 0·1 millimetre in width, with wavy walls When cut parallel to the flat surfaces, a strongly curved embryo is seen embedded in an oily endosperm.

Hyoscyamus seed **contains** about 0·05 to 0·1 per cent. of alkaloid, consisting of hyoscyamine with a small proportion of hyoscine (scopolamine) The seed also contains about 20 per cent. of fixed oil.

Standard.—Hyoscyamus seed contains not more than 2 per cent. of foreign organic matter. Ash, not more than 4 per cent.

Action and Uses.—Hyoscyamus seed has been used as a domestic remedy for toothache; the vapour obtained by heating the seed on a

hot plate is applied locally by means of a funnel, or a poultice may be made from the crushed material. Liquor Hyoscyami (Bastich) is a liquid extract of hyoscyamus seed which is used in the same way as tincture of hyoscyamus.

HYOSCYAMINA

(Hyoscyamin.)

Hyoscyamine

$C_{17}H_{23}O_3N = 289{\cdot}2$

Hyoscyamine is the chief alkaloidal constituent of belladonna, hyoscyamus, stramonium and other solanaceous plants. The best source is Egyptian henbane, *Hyoscyamus muticus* Linn. From the total alkaloids of this plant, hyoscyamine may be isolated and purified as the oxalate, the recovered base being finally crystallised from dilute alcohol. It occurs as colourless, glistening, felted needles, or as a white, crystalline powder, without odour, but bitter and acrid to the taste. It is lævorotatory, and is readily racemised to atropine (*dl*-hyoscyamine) in the presence of dilute alkali. 0·05 gramme, dissolved in 5 millilitres of water acidified with hydrochloric acid, yields with auric chloride solution a yellow precipitate which, recrystallised from water acidified with hydrochloric acid, forms brilliant, golden-yellow scales, having when dried, a melting-point of 165° (distinction from atropine and hyoscine). The picrate crystallises from dilute alcohol in plates, which melt at 165° 0·01 gramme of the base, evaporated to dryness on a water-bath with 5 drops of nitric acid, leaves a residue which, when moistened with alcoholic potassium hydroxide solution, produces a violet colour. This colour is also given by atropine and hyoscine (scopolamine), but a red colour is given under these conditions by pseudaconitine. On hydrolysis with acids or alkalis, hyoscyamine is converted into tropine, $C_8H_{15}ON$, and tropic acid, $C_9H_{10}O_3$.

Sparingly **soluble** in water; more soluble in ether; readily soluble in benzene, chloroform and alcohol.

Standard.—Hyoscyamine does not melt below 107°. Specific rotation in alcohol (50 per cent.), not below −21°. Ash, not more than 0·1 per cent

Action and Uses.—Hyoscyamine has an action similar to that of hyoscyamine sulphate

Dose.– 0·0003 to 0·0006 gramme ($\frac{1}{200}$ to $\frac{1}{100}$ grain).

DATURINA.—Daturine is a mixture of alkaloids obtained from *Datura Stramonium* Linn. (Fam. Solanaceæ). It consists chiefly of hyoscyamine, with a variable proportion of atropine. It occurs in white, silky crystals and is slightly soluble in water, but freely soluble in alcohol, ether and chloroform. The action of daturine is similar to that of hyoscyamine. It is occasionally used as a mydriatic in ophthalmology. Dose.– 0·0005 to 0·001 gramme ($\frac{1}{120}$ to $\frac{1}{60}$ grain).

HYOSCYAMINÆ HYDROBROMIDUM

(Hyoscyamin. Hydrobrom.)

Hyoscyamine Hydrobromide

$C_{17}H_{23}O_3N,HBr = 370{\cdot}1$

Hyoscyamine hydrobromide is the hydrobromide of the alkaloid hyoscyamine. It occurs in white, prismatic crystals with an acrid, bitter taste. It melts at about 152°. The aqueous solution is lævorotatory, and it responds to the identity and distinguishing tests given under Hyoscyamina. It should be **stored** in well-stoppered, amber-coloured bottles.

Very **soluble** in water; soluble in alcohol and chloroform; only sparingly soluble in ether.

Standard.—Hyoscyamine hydrobromide loses, on drying at 100°, not more than 1 per cent. of its weight. Ash, not more than 0·1 per cent. A 5 per cent. solution in water is neutral to litmus, and on the addition of platinic chloride solution no precipitate is produced (limit of most other alkaloids). The solution obtained by dissolving 0·05 gramme in 1 millilitre of sulphuric acid is not coloured more than faintly yellow (limit of readily carbonisable impurities).

Action and Uses.—Hyoscyamine hydrobromide has an action similar to that of hyoscyamine sulphate. Solutions for **injection** may be sterilised by tyndallisation or by filtration. The containers must comply with the tests for limit of alkalinity of glass, and the solution should be stored in a cool place protected from light.

Dose.– 0·0003 to 0·0006 gramme ($\frac{1}{200}$ to $\frac{1}{100}$ grain).

HYOSCYAMINÆ SULPHAS

(Hyoscyamin. Sulph.)

Hyoscyamine Sulphate

$(C_{17}H_{23}O_3N)_2,H_2SO_4 = 676{\cdot}5$

Hyoscyamine sulphate is the sulphate of the alkaloid hyoscyamine. It occurs as a white, deliquescent, crystalline powder, without odour, but with a bitter, acrid taste. The aqueous solution is lævorotatory, and it responds to the identity and distinguishing tests given under Hyoscyamina. It should be **stored** in well-stoppered, amber-coloured bottles.

Soluble in water (2 in 1) and alcohol (1 in 4·5); very slightly soluble in ether and chloroform.

Standard.—Hyoscyamine sulphate does not melt below 203°. Loss, on drying at 100°, not more than 1 per cent. Ash, not more than 0·1 per cent. A 5 per cent. aqueous solution is neutral to litmus.

Action and Uses.—Hyoscyamine is intermediate in its action between atropine and hyoscine. It causes less stimulation of the central nervous system than atropine, and is a weaker sedative and hypnotic than hyoscine (see Atropina and Hyoscinæ Hydrobromidum). It has the same action peripherally as atropine, but is more powerful. Hyoscyamine sulphate is **administered** hypodermically, or given in pills, for mental excitement and insomnia, especially in delirium tremens and mania, but is less reliable than Hyoscinæ Hydrobromidum. It is used to relieve the tremor, rigidity and excessive salivation in paralysis agitans. Large doses may be necessary. Doses of 0·0006 gramme ($\frac{1}{100}$ grain) are recommended in sea-sickness, hourly, if required; doses as large as 0·006 gramme ($\frac{1}{10}$ grain) may be given in mania. A solution for **injection** may be sterilised by tyndallisation or by filtration.

Dose.– 0·0003 to 0·0006 gramme ($\frac{1}{200}$ to $\frac{1}{100}$ grain).

DUBOISINÆ SULPHAS.—Duboisine sulphate is a mixture of alkaloidal sulphates obtained from *Duboisia myoporoides* R. Br. (Fam. Solanaceæ), and consists chiefly of hyoscyamine and hyoscine sulphates. It occurs as a very hygroscopic, amorphous, yellowish-white powder, or in granules, and is soluble in water or alcohol. Duboisine sulphate is a sedative hypnotic and mydriatic of variable strength. Its principal use is in ophthalmology; as a mydriatic it is much more powerful than atropine, and is applied in solution (0·2 to 0·5 per cent.) or as an ointment. Dose.– 0·00025 to 0·001 gramme ($\frac{1}{240}$ to $\frac{1}{60}$ grain).

HYOSCYAMUS
(Hyoscy.)

Hyoscyamus

Synonyms—Hyoscyami Folia; Hyoscyamus Leaves; Henbane Leaves.

Hyoscyamus consists of the dried leaves and flowering tops of *Hyoscyamus niger* Linn. (Fam. Solanaceæ), an erect herb distributed throughout Europe and cultivated in England and elsewhere. It should be **stored** in a dry place.

The laminæ are pale green in colour, and vary in length up to about 25 centimetres, the lower leaves being stalked and ovate-lanceolate, while the upper leaves are shorter, sessile, and ovate-oblong to triangular-ovate. The margin is coarsely dentate, and the apex acute; the midrib is broad, yellowish and conspicuous. The leaves are covered on both sides with long, soft hairs, many of which secrete a resinous substance, rendering the leaves clammy to the touch. The flowers, which are crowded together, arise in the axils of large, hairy bracts; they have a green, hairy, gamosepalous calyx, a yellow, purple-veined, slightly zygomorphic, gamopetalous corolla. The superior ovary is two-celled, and contains numerous ovules. Hyoscyamus has a strong, characteristic odour, and a bitter, slightly acrid taste.

The diagnostic **microscopical** characters are the wavy walls and smooth cuticle of the epidermal cells; the typical cruciferous stomata on both surfaces; the uniseriate hairs, up to 300 microns in length, of two kinds, some simple and 2 to 4 cells long, but the majority terminating in an oval, multicellular gland; the calcium oxalate crystals in the mesophyll, either single prisms, twin crystals, or clusters of few components; the absence of sclerenchymatous fibres.

Hyoscyamus **contains** the alkaloid hyoscyamine, together with smaller quantities of atropine and hyoscine (scopolamine). The proportion of alkaloid in the carefully dried leaf varies from 0·045 to 0·14 per cent. In isolated cases, larger yields of alkaloid (up to 0·27 per cent.) have been reported, but these are exceptional. Volatile bases, similar to those in belladonna leaf, are also present.

Varieties.—Hyoscyamus occurs both as an annual and as a biennial, and the corresponding leaves are available in commerce. Annual hyoscyamus is smaller than the biennial; the leaves are less hairy and less incised and the corolla is not so deeply purple-veined. The commercial drug frequently contains a large proportion of stem. The leaves of the first year's growth of the biennial plant are large, petiolate, and may be up to 30 centimetres or more in length; they are free from admixture with the flowers. Second biennial hyoscyamus consists of the flowering tops of the biennial variety. These three varieties are approximately equal in alkaloidal content. Much hyoscyamus is imported from the South of France, where it is probably collected from annual plants; it usually contains a larger proportion of stem than the English drug, is less carefully dried, and contains less alkaloid. It has been suggested that much of the foreign hyoscyamus is derived from *H. albus* Linn.

Substitute.—Egyptian hyoscyamus, from *H. muticus* Linn., may be distinguished from the genuine drug by the elongated-cylindrical fruits and the branched, non-glandular hairs. It often contains a considerable proportion of stout, yellowish stalks, and is used for the production of hyoscyamine (or atropine), of which it contains from 0·2 to about 1 per cent.

Standard, B.P.—Hyoscyamus contains not less than 0·05 per cent. of the alkaloids of hyoscyamus, calculated as hyoscyamine. It contains not more than 2 per cent. of foreign organic matter, and not more than 1 per cent. of its stem has a width greater than 5 millimetres. Ash, not more than 20 per cent. Acid-insoluble ash, not more than 12 per cent.

Hyoscyamus, in powder (Pulvis Hyoscyami : Pulv. Hyoscy.) contains the constituents and possesses the diagnostic microscopical characters of Hyoscyamus, and complies with the limits for alkaloids, ash and acid-insoluble ash of the unground drug.

Action and Uses.—Hyoscyamus possesses an action similar to that of belladonna, but on account of the hyoscine which it contains, cerebral excitement is less likely to occur. It is usually **administered** as extract, liquid extract, or tincture, and is used to counteract the griping action of purgatives, such as calomel, aloes, or colocynth. The tincture is given in cystitis and as an antispasmodic in asthma, although it is less reliable for this purpose than tinctures of belladonna and stramonium. In cases of **poisoning** by hyoscyamus, the procedure adopted under Belladonnæ Folium should be followed.

Dose.—0·2 to 0·4 gramme (3 to 6 grains).

Preparations

Extractum Hyoscyami Liquidum, B.P.—(Ext. Hyoscy. Liq.)—Liquid Extract of Hyoscyamus. It is prepared with alcohol (70 per cent.), concentration being effected under reduced pressure at a temperature not exceeding 60°. It is adjusted to contain 0·05 per cent. w/v of the alkaloids of hyoscyamus, calculated as hyoscyamine (limit, 0·045 to 0·055); 0·4 millilitre contains 0·0002 gramme, and 6 minims contains about $\frac{1}{300}$ grain, of alkaloids. Dose.– 0·2 to 0·4 millilitre (3 to 6 minims).

Extractum Hyoscyami Siccum, B.P.—(Ext. Hyoscy. Sicc.)—Dry Extract of Hyoscyamus. It is prepared with alcohol (70 per cent.) and adjusted with hyoscyamus, in fine powder, to contain 0·3 per cent. of the alkaloids of hyoscyamus, calculated as hyoscyamine (limits, 0·27 to 0·33); 0·06 gramme contains 0·00018 gramme, and 1 grain contains about $\frac{1}{300}$ grain, of alkaloids. It should be stored in small, wide-mouthed, well-closed containers in a cool place. Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

Extractum Hyoscyami I.A. is prepared with alcohol (70 per cent.), evaporation being conducted at temperatures below 50°.

Pilula Colocynthidis et Hyoscyami, B.P.—(Pil. Colocynth. et Hyoscy.)—Pill of Colocynth and Hyoscyamus. Colocynth, about 12·5 per cent., aloes and scammony resin, of each about 25 per cent., with curd soap, oil of clove, dry extract of hyoscyamus and syrup of liquid glucose. Dose.– 0·25 to 0·5 gramme (4 to 8 grains).

Succus Hyoscyami, B.P.C.—(Succ. Hyoscy.)—Juice of Hyoscyamus. The juice expressed from the fresh leaves and flowering tops of *Hyoscyamus niger* Linn., mixed with one-third of its volume of alcohol (90 per cent.). Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Tinctura Hyoscyami, B.P.—(Tinct. Hyoscy.)—Tincture of Hyoscyamus. Liquid extract of hyoscyamus, 10 per cent. v/v, in alcohol (70 per cent.). It contains 0·005 per cent. w/v of the alkaloids of hyoscyamus, calculated as hyoscyamine (limits, 0·0045 to 0·0055); 4 millilitres contains 0·0002 gramme, and 1 fluid drachm contains about $\frac{1}{300}$ grain, of alkaloids. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Tinctura Hyoscyami I.A. is prepared with alcohol (70 per cent.) from 10 per cent. w/w of hyoscyamus leaf.

ICHTHAMMOL

(Ichtham.)

Ichthammol

Synonym—Ammonium Ichthosulphonate.

Ichthammol consists mainly of the ammonium salts of the sulphonic acids prepared from an oily substance obtained by the destructive distillation of bituminous schists, with ammonium sulphate and water. The schist is composed largely of the remains of fish and marine animals, and yields from 1 to 10 per cent. of oil, which contains about 10 per cent. of sulphur. On treating the oil with sulphuric acid, ichthosulphonic acid is formed, which is neutralised with ammonia to give an impure ammonium ichthosulphonate.

Ichthammol occurs as a blackish-brown, viscous liquid with a strong, characteristic odour. When heated with sodium hydroxide, ammonia is evolved. On the addition of hydrochloric acid to a dilute aqueous

solution, a dark, resinous mass is precipitated. Ichthammol contains, in addition to ammonium ichthosulphonate, about 1 per cent. of volatile oil with a strong, penetrating odour, from 5 to 7 per cent. of ammonium sulphate and about 50 per cent. of water.

Soluble in water; partially soluble in alcohol (90 per cent.) and ether; entirely soluble in a mixture of equal parts of alcohol (90 per cent.) and ether; miscible with glycerin and oils.

Standard, B.P.—Ichthammol contains not less than 10·5 per cent. w/w of organically combined sulphur, calculated on the substance dried at 100°, and not more sulphur in the form of sulphates than one-fourth of the total sulphur. Loss, on drying at 100°, not more than 50 per cent. Residue, on ignition with sulphuric acid followed by re-ignition with sulphuric acid. not more than 0·3 per cent.

Action and Uses.—Ichthammol is a mild antiseptic, and is employed in cutaneous disorders. It may be administered internally or applied externally. Taken internally, it is mildly irritant and antiseptic to the gastro-intestinal tract; it is used in gastro-intestinal catarrh, and in acne, eczema and other skin diseases. It is partially absorbed when applied to the skin, and has a stimulating and mildly irritant action in chronic skin diseases such as acne, furunculosis and eczema. It may be **administered** in capsules, pills, or in solution in glycerin Aqueous solutions are used as gargles, lotions (5 to 30 per cent.), injections for gonorrhœa and cystitis (1 to 5 per cent.), and pigments (20 to 50 per cent.) which dry on the skin. Gelatin suppositories and pessaries containing ichthammol have been observed occasionally to become insoluble on keeping. Ointments (10 to 50 per cent.) made with hydrous wool fat, or paints prepared with glycerin, are of value, smeared over the inflamed areas, in acute articular rheumatism and in erysipelas. Ichthammol mixed with zinc oxide, or bismuth oxide, or a mixture of zinc oxide and magnesium carbonate, may be used in a dry condition for burns. Mixed with glycerin it is applied on tampons in the treatment of cervicitis. Alkaloids are to some extent **incompatible,** since they form insoluble salts of ichthosulphonic acid.

Dose.—0·3 to 0·6 gramme (5 to 10 grains).

Preparations

Collodium Ichthammolis, B.P.C.—(Collod. Ichtham.)—Ichthammol Collodion. *Syn.*—Ammonium Ichthosulphonate Collodion. Ichthammol, 1 in 8, in simple collodion.

Collodium Ichthammolis cum Æthere, B.P.C.—(Collod. Ichtham. c. Æther.)—Ichthammol Collodion with Ether. *Syn.*—Ammonium Ichthosulphonate Collodion with Ether. Ichthammol, 1 in 4, in ether and simple collodion.

Gelatinum Zinci et Ichthammolis, B.P.C.—(Gelat. Zinc. et Ichtham.)—Gelatin of Zinc and Ichthammol. *Syn.*—Pasta Zinci et Ichthammolis; Unna's Paste with Ichthammol. Ichthammol, about 2 per cent., with zinc oxide, glycerin, gelatin and distilled water.

Glycerinum Ichthammolis, B.P.C.—(Glycer. Ichtham.)—Glycerin of Ichthammol. *Syn.*—Glycerin of Ammonium Ichthosulphonate 1 in 10.

Parogenum Ichthammolis, B.P.C.—(Parogen. Ichtham.)—Ichthammol Parogen. *Syn.*—Ichthammol Vasoliment; Ammonium Ichthosulphonate Parogen. Ichthammol, 10 per cent. w/v, in parogen.

Pasta Ichthammolis, B.P.C.—(Past. Ichtham.)—Ichthammol Paste. *Syn.*—Ammonium Ichthosulphonate Paste; Gelatinum Ichthammol; Ammonium Ichthosulphonate Jelly. Ichthammol, about 10 per cent., with gelatin, glycerin and distilled water.

Suppositorium Ichthammolis, B.P.C.—(Supp. Ichtham.)—Ichthammol Suppository. *Syn.*—Ammonium Ichthosulphonate Suppository. Each suppository contains 3 grains of ichthammol in suppository of glycerin.

Unguentum Chrysarobini Compositum, B.P.C.—(Ung. Chrysarob. Co.)—Compound Chrysarobin Ointment. Chrysarobin and ichthammol, of each 5 per cent., and salicylic acid, 2 per cent., in yellow soft paraffin.

Unguentum Ichthammolis, B.P.C.—(Ung. Ichtham.)—Ichthammol Ointment. *Syn.*—Ammonium Ichthosulphonate Ointment. Ichthammol, 10 per cent., in wool fat ointment.

Unguentum Ichthammolis Compositum, B.P.C.—(Ung. Ichtham. Co.)—Compound Ichthammol Ointment. *Syn.*—Compound Ammonium Ichthosulphonate Ointment. Ichthammol, 9 per cent., with precipitated sulphur, zinc oxide, starch, resorcinol, betanaphthol and salicylic acid, in wool fat ointment.

Unguentum Pyrogallolis Compositum, B.P.C.—(Ung. Pyrogall. Co.)—Compound Ointment of Pyrogallol. *Syn.*—Unguentum Acidi Pyrogallici Compositum; Compound Pyrogallic Acid Ointment; Unna's Compound Pyrogallol Ointment. Pyrogallol and ichthammol, of each 5 per cent., and salicylic acid, 2 per cent., in yellow soft paraffin.

ICHTHYOCOLLA

(Ichthyocoll.)

Isinglass

Isinglass is the dried, prepared swimming-bladder of the sturgeon, *Acipenser huso* Linn., and of other species of *Acipenser* (Order Sturiones), found in the Caspian and Black Seas and in the rivers which flow into them. The bladders are removed and cut open; they are then soaked in water, spread out on boards, and the outer, silvery membrane removed by rubbing. They are finally dried and are marketed in various forms.

The drug occurs usually in semi-transparent, iridescent, membranous, whitish, horny or pearly shreds When soaked in water, it softens, swells and becomes more transparent; it dissolves almost entirely in boiling water. A solution in boiling water, 1 in 50, forms, on cooling, an opalescent jelly. It is insoluble in alcohol, but dissolves in most of the dilute acids and alkalis. With tannic acid it forms an insoluble compound. Isinglass is odourless and has a mucilaginous taste.

Isinglass **contains** about 80 per cent. of collagen, about 3 per cent. of insoluble membrane, and from 15 to 20 per cent. of moisture. It also contains traces of arsenic, about 0·5 to 1 part per million.

Varieties.—Isinglass prepared in sheets is known as "leaf isinglass," or, if several are folded together before drying, as "book isinglass"; each prepared bladder is sometimes rolled and folded round pegs in the form of a horse-shoe, heart or lyre and then forms "staple isinglass." Russian isinglass, exported from the Caspian and Black Seas, is considered the best; Brazilian isinglass is inferior and may be distinguished by its yellowish or brownish colour.

Substitutes.—Similar substances are made from the swimming-bladders of cod, ling, hake, etc., and are characterised by a higher yield of ash and of substances insoluble in water.

Standard.—Isinglass yields not more than 1 per cent. of ash, and not more than 3 per cent. of water-insoluble matter.

Uses.—Isinglass is used in the preparation of "court plaster" and surgeon's isinglass plaster. A plaster, made from a solution spread upon white felt, is used to remove pressure from corns and bed-sores. It has been used as a nutrient in place of gelatin, and as a "fining" for wines and beers.

IGNATIA
(Ignat.)

Ignatia

Synonyms—Ignatia Amara; St. Ignatius Bean.

Ignatia consists of the dried, ripe seeds of *Strychnos Ignatii* Berg. (Fam. Loganiaceæ), a woody, climbing shrub indigenous to Samar and other parts of the Philippine Islands.

The seeds are irregularly ovate and bluntly angular in shape, and measure about 25 millimetres in length and rather less in breadth and thickness; they are very hard, and of a dull brownish or dark grey colour. Patches of the dull ash-grey seed coat are occasionally present, bearing numerous appressed hairs, but the greater part has been rubbed off, disclosing the dark endosperm, which is copious and is usually hollow in the centre, where the embryo, with a small radicle and leafy cotyledons, is found. The seeds are without odour, but have an extremely bitter taste.

The diagnostic **microscopical** characters are the hairs with ribs of thickening, similar to those of nux vomica, and with ramified bases, neither the ribs nor the bases being lignified; the polygonal cells of the hypodermis with thickened and pitted walls; the thick-walled cells of the endosperm.

Ignatia **contains** the alkaloids, strychnine and brucine, which are present to the extent of from 2·5 to 3 per cent., rather more than half being strychnine.

Action and Uses.—Ignatia possesses a medicinal action similar to that of nux vomica, over which it has no evident superiority. In cases

of **poisoning** by ignatia, the antidotes for strychnine should be administered.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

Preparation

Tinctura Ignatiæ, B.P.C.—(Tinct. Ignat.)—Tincture of Ignatia. 1 in 10. Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

INDICARMINUM

(Indicarmin.)

Indigo Carmine

$C_{16}H_8O_8N_2S_2Na_2 = 466·2$

Synonym—Sodium Indigotindisulphonate.

Indigo carmine is the disodium salt of indigotin-5 : 5′-disulphonic acid, and may be prepared by the action of sulphuric acid on synthetic or natural indigo, the resulting indigotindisulphonic acid being purified, neutralised with sodium carbonate and the sodium salt precipitated by the addition of sodium chloride; a considerable amount of sodium chloride is carried down by the precipitated indigo carmine. It occurs as an almost odourless, blue powder, or in blue granules, with a coppery lustre and a saline taste. It is precipitated from the aqueous solution by the addition of sodium chloride, while the deep blue colour of the aqueous solution is destroyed by treatment with nitric acid, bromine water, or chlorine water, or by reduction with zinc and sodium hydroxide. On ignition, it leaves a residue of sodium sulphate.

Soluble in water (about 1 in 100); almost insoluble in alcohol.

Standard, B.P.—Indigo carmine contains not less than 90 per cent. of $C_{16}H_8O_8N_2S_2Na_2$, calculated on the substance dried at 100°. Loss on drying at 100°, not more than 10 per cent. Residue on ignition with sulphuric acid, followed by re-ignition with sulphuric acid, not less than 30 per cent. and not more than 40 per cent., calculated on the substance dried at 100°. Arsenic limit, 10 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for insoluble matter and for acidity or alkalinity.

Uses.—Indigo carmine is employed as a test for efficiency of the kidney. It is **administered** intravenously or intramuscularly; the usual dose is 4 millilitres of a freshly prepared 0·4 per cent. solution, but occasionally the dose is increased up to a maximum of 10 millilitres. Solutions for **injection** may be sterilised by heating in an autoclave or by tyndallisation. The colour should appear in the urine in ten minutes or so after injection if the kidneys are functioning properly.

Dose.– 0·05 to 0·1 gramme (¾ to 1½ grains), by intramuscular

injection; 0·008 to 0·016 gramme ($\frac{1}{8}$ to $\frac{1}{4}$ grain) by intravenous injection.

Indigo.—Indigo is a colouring matter which may be obtained by the hydrolysis of the glycoside, indican, present in the leafy shoots of various species of *Indigofera* Natural indigo (Colour Index No. 1247) contains other substances such as indigo gum, indigo brown and indigo red which affect the tint. Most of the indigo of commerce is now obtained synthetically (Colour Index No. 1177). It occurs in the form of brick-shaped cakes or as a dark blue powder. Indigo is insoluble in most solvents and only slightly soluble in hot chloroform, amyl alcohol, carbon disulphide and acetic acid. Indigo was at one time employed in medicine for the treatment of disorders of the nervous system, but its use has been discontinued.

INSULINUM
(Insulin.)

Insulin

Insulin is a preparation containing the specific anti-diabetic principle of the mammalian pancreas, and may be prepared from fresh pancreas, or pancreas which has been stored in the frozen condition, by extraction of the finely divided material with alcohol. The precipitate obtained by adding stronger alcohol is dissolved in water, the active material is separated by adjusting the solution to *p*H5 to *p*H6 and the precipitate dried. It may also be separated by adding trinitrophenol and dissolving the product in alcohol containing hydrochloric acid of definite strength: the precipitate obtained by pouring the solution into acetone is collected and dried. *Insulin in Solution* is a solution of the dry powder in acidified water containing an antiseptic to prevent the growth of bacteria. The solution is sterilised by filtration, and packed in sealed glass ampoules containing one dose, in which case no antiseptic need be added, or in suitable glass phials containing several doses; each container is labelled with the number of units per millilitre and the date of manufacture. The solution should be **stored** at a temperature below 20°; it is stable for about eighteen months after manufacture if its reaction lies between *p*H3 and *p*H4. *Insulin in Tablet Form* consists of sterile tablets of dry insulin mixed with a neutral substance such as lactose, packed in sterile containers and labelled with the number of units contained in each tablet.

Standard, B.P.—Insulin complies with the tests for sterility, and the solution contains 20 units per millilitre. It is controlled by the regulations made under the Therapeutic Substances Act, 1925. It is assayed biologically by comparing the dose necessary to produce hypoglycæmia in rabbits, or convulsions in mice, with the dose of a standard preparation which will produce the same effects. Suggested details of the method of assay on rabbits are described in the British Pharmacopœia. The standard preparation for Great Britain and Northern Ireland is a quantity of dry, soluble insulin hydrochloride prepared and kept in

the National Institute for Medical Research, London. The unit is the specific activity contained in such an amount of the standard preparation as the Medical Research Council may from time to time indicate as the quantity exactly equivalent to the unit accepted for international use.

Action and Uses.—If the pancreas is removed from a dog or cat, the percentage of sugar in the blood rises and sugar appears in the urine as dextrose; this sugar comes in part from sugar in the food, and in part from the conversion of other substances in the body into dextrose. In consequence of this continual loss of dextrose, the animal loses weight. Acetoacetic acid and β-hydroxybutyric acid are formed in the body as a result of the incomplete combustion of fats, and are excreted in the urine. Their presence may be recognised by the odour of acetone in the urine and in the breath. When these substances are present in the blood in large amount, coma is produced, and death may follow quickly. Insulin, when injected, causes a fall of the blood sugar and, in consequence, stops the loss of sugar in the urine. It also renders possible the complete oxidation of acetoacetic and β-hydroxybutyric acids. The amount of sugar in the blood of a normal individual, fasting (estimated before breakfast), is usually between 80 and 120 milligrams in 100 millilitres; after a carbohydrate meal it may rise to as much as 130 or 170 milligrams. So long as the blood contains less than 180 milligrams of sugar in 100 millilitres (called the renal threshold for sugar) no sugar is eliminated by the kidneys (except in the condition known as renal glycosuria in which the renal threshold for sugar is abnormally low), but above this level sugar appears in the urine. It is generally agreed that a fasting level of over 130 milligrams, with an increase to 200 milligrams or more after a meal, is indicative of true diabetes mellitus.

The chief use of insulin is in the treatment of diabetes mellitus, in which condition there is a lack of the internal secretion of the pancreas. Its administration in adequate doses in this condition keeps the blood sugar within normal limits and thereby prevents glycosuria. With the aid of insulin, patients suffering from severe diabetes are able to take a relatively high proportion of carbohydrate in their diet. Insulin can only be used subcutaneously or intravenously, oral administration being useless. The dose of insulin is regulated by estimation of the patient's blood sugar and by examination of the urine for sugar. The latter method is only a rough guide, since the renal threshold for sugar may be higher than normal in cases of diabetes. The blood sugar control is important for two reasons. Firstly, to find out what is an adequate dose to control the hyperglycæmia and glycosuria and, secondly, to avoid the dangers of hypoglycæmia due to an overdose.

Insulin exerts its maximum effect about four to five hours after injection, and it is at this time that symptoms of over-dosage such as sweating, faintness, irritability and double vision are liable to occur. These symptoms are liable to be induced and aggravated by exercise; patients should be warned of this possibility, and recommended

to carry with them a little cane sugar or barley sugar as an emergency remedy. Doses as a rule are given twice daily, thirty minutes before the principal carbohydrate meals, and a suitable dose with which to commence treatment of a mild case is 5 to 10 units In diabetic coma, a large dose, 60 to 100 units, should be given in part subcutaneously and in part intravenously Specimens of urine should be collected, by catheter if necessary, every three hours. If the second specimen, that is, the one obtained six hours after the insulin injection, contains sugar, a further dose of 30 to 50 units should be given So long as sugar appears in quantity in the urine six hours after the injection of insulin, provided the bladder has been emptied three hours after the injection, more insulin may safely be given. A blood sugar estimation should be made as early as possible in any case of diabetic coma, and as frequently as possible afterwards, since only by this information can the dosage of insulin be safely guided. It should be noted that with vigorous treatment the patient may easily pass into hypoglycæmic coma, without any intermediate return to consciousness. In a suspected case of diabetic coma, when the diagnosis is not certain, dextrose must be administered if it is decided to give insulin. It is important to remember that the treatment of diabetic coma does not begin and end with the administration of insulin. Liquids must be given freely by all available routes, and any eradicable sepsis dealt with immediately. Insulin combined with the administration of dextrose is a useful measure in the treatment of wasting diseases such as exophthalmic goitre, anorexia nervosa, as well as in the liver toxæmias and for the prevention of ketosis following a general anæsthetic. Insulin in solution should be dispensed unless insulin in tablets is specified.

Dose.—5 to 100 units, by subcutaneous injection

IODOFORMUM

(Iodof.)

Iodoform

$CHI_3 = 393{\cdot}8$

Iodoform is triiodomethane, CHI_3, and may be obtained by the action of iodine on ethyl alcohol or acetone in the presence of an alkali. It may also be prepared by the electrolysis of a solution of potassium carbonate and potassium iodide in alcohol and water. It occurs as a lemon-yellow powder, somewhat unctuous to the touch, tending to agglomerate, and suitable for mixing with other powders, as powdered crystals remaining powdery and suitable for use with a dredger or insufflator, and as larger crystals which are preferred by some surgeons for application to extensive wounds. It has a characteristic, persistent, disagreeable odour and a sweetish, iodine-like taste. Specific gravity

about 2·0. The powdered form sometimes contains a trace of moisture, and may therefore give turbid solutions with chloroform or carbon disulphide; a short exposure to the air, however, will quickly free it from adherent moisture. Iodoform is soluble in warm alcoholic solution of potassium hydroxide; if the solution is rendered acid by the addition of nitric acid, iodine is precipitated. It should be **stored** protected from light.

Very slightly **soluble** in water and benzene; soluble in alcohol (90 per cent.) (1 in 100), ether (1 in 8), chloroform (1 in 10), glycerin (about 1 in 100), collodion (1 in 10), carbon disulphide (1 in 3), olive oil (1 in 30), and in other fixed and volatile oils.

Standard, B.P.—Iodoform contains not less than 99 per cent. of CHI_3. Melting-point, 120° to 122° Ash, not more than 0·2 per cent. It complies also with tests for absence of soluble yellow colouring matters and of iodides.

Action and Uses.—Iodoform is used in surgery as an antiseptic for application to wounds. It has very little germicidal power *in vitro*, and it does not destroy pathogenic organisms, although it inhibits their growth. Its beneficial action when applied to wounds appears to be due to its effect in reducing secretion from the wounded surface by hindering the emigration of leucocytes from the blood vessels, and to the fact that iodine is liberated by contact of the iodoform with the organic material of the tissues and secretions; the nascent iodine developed is thus the active agent and, doubtless, it enters at once into combination with proteins, acting as a stimulant and facilitating the absorption of exudation. Iodoform has also some local anæsthetic action. When taken internally, it is partly absorbed as such and partly as iodide, through decomposition. Iodoform enclosed in a glutoid capsule is used as a test of pancreatic efficiency; if the pancreas is active, the capsule dissolves in the intestine, and iodine can be detected in the saliva after about two hours.

Absorption, with symptoms of iodism, sometimes occurs from prolonged or extensive application of iodoform to wounded surfaces. Besides symptoms of iodism, iodoform may produce effects very similar to those of chloroform; the stage of excitement is very prolonged, lasting several hours, and is followed by narcosis. For internal administration, it is prescribed in pills or in capsules, sometimes, if intended for use in phthisis, with oil of eucalyptus and guaiacol. Suppositories, pessaries and bougies may contain oil of eucalyptus to cover the persistent odour; coumarin is also used in ointments or dusting powders for the same purpose.

Glycerinum Iodoformi and Injectio Iodoformi (iodoform, 10 per cent. w/v, mucilage of tragacanth, 20 per cent v/v, in distilled water), well diluted, are used for injection into tuberculous sinuses and as bladder antiseptics. As an application to the throat, nose and ear, Pulvis Iodoformi et Acidi Borici is suitable and is particularly useful in tuberculous laryngitis, when it may be supplemented by the action of

ultra-violet light. Pigmentum Iodoformi Compositum is used in surgery for application to moist surfaces such as that of the tongue. Carbasus Iodoformi is employed as a surgical dressing. Pasta Bismuthi et Iodoformi is used largely as an antiseptic dressing for the treatment of abscesses and wounds; the surfaces are cleaned and smeared with the paste. In cases of **poisoning** by iodoform, sodium bicarbonate should be given freely, followed by alcoholic stimulants and the application of warmth.

Dose.– 0·03 to 0·2 gramme (½ to 3 grains).

IODOPYRROLUM.—Iodopyrrole, or iodol, C_4HNI_4, is obtained by the action of iodine upon pyrrole in the presence of alcohol. It occurs as a light greyish-brown, almost odourless, crystalline powder. When dissolved in sulphuric acid, it forms a green solution which gradually changes to brown. It is decomposed when heated above 140°, with liberation of iodine. It is almost insoluble in water, but soluble in alcohol (1 in 18), ether (1 in 1·5), chloroform (1 in 150), glycerin (1 in 155) and fixed oils. Iodopyrrole has been used as a substitute for iodoform as a dusting powder in infections of the larynx and also as an ointment containing from 10 to 20 per cent. **Dose.**– 0·06 to 0·25 gramme (1 to 4 grains).

Preparations

Carbasus Iodoformi, B.P.C.—(Carbas. Iodof.)—Iodoform Gauze. It contains about 5 per cent. of iodoform.

Glycerinum Iodoformi, B.P.C.—(Glycer. Iodof.)—Glycerin of Iodoform. *Syn.*—Emulsio Iodoformi. 1 in 10.

Oculentum Iodoformi, B.P.—(Oculent. Iodof.)—Iodoform Ointment for the Eye. Iodoform, 4 per cent., in simple eye ointment. It should be stored in small, well-closed containers in a cool place, and protected from light.

An ointment for the eye, prepared with 10 per cent. of iodoform, was included in the British Pharmaceutical Codex, 1923.

Oculentum Iodoformi et Atropinæ, B.P.C.—(Oculent. Iodof. et Atrop.)—Iodoform and Atropine Eye Ointment. Iodoform, about 5 per cent., and atropine sulphate, about 0·1 per cent., in simple eye ointment.

Pasta Bismuthi et Iodoformi, B.P.C.—(Past. Bism. et Iodof.)—Bismuth and Iodoform Paste. *Syn.*—B.I.P.P. Bismuth subnitrate, 25 per cent., and iodoform, 50 per cent., with liquid paraffin.

Pigmentum Iodoformi Compositum, B.P.C.—(Pig. Iodof. Co.)—Compound Iodoform Paint. *Syn.*—Whitehead's Varnish. Iodoform, 10 per cent. w/v, with benzoin, storax and balsam of tolu, in ether.

Pulvis Iodoformi et Acidi Borici, B.P.C.—(Pulv. Iodof. et Acid. Boric.)—Iodoform and Boric Acid Powder. Iodoform, 1 in 4, with boric acid.

Suppositorium Iodoformi, B.P.—(Supp. Iodof.)—Iodoform Suppository. Each suppository contains 0·2 gramme (3 grains) of iodoform.

Unguentum Iodoformi, B.P.C.—(Ung. Iodof.)—Iodoform Ointment. Iodoform, 10 per cent., in simple ointment.

This ointment, prepared with lard instead of simple ointment, was included in the British Pharmacopœia, 1914.

Unguentum Iodoformi et Eucalypti, B.P.C.—(Ung. Iodof. et Eucalyp.)—Iodoform and Eucalyptus Ointment. Iodoform, 2 per cent., and oil of eucalyptus, about 20 per cent., in hard and soft paraffins.

IODOPHTHALEINUM

(Iodophthal.)

Iodophthalein

$C_{20}H_8O_4I_4Na_2,3H_2O = 919{\cdot}8$

Synonyms—Sodium Tetraiodophenolphthalein; Tetraiodophthalein Sodium

Iodophthalein is the di-sodium salt of tetraiodophenolphthalein, and may be prepared by the iodination of phenolphthalein. It occurs as an odourless, blue or blue-violet, crystalline powder with a saline, astringent taste. It darkens in colour when heated, and is decomposed with evolution of vapours of iodine. The aqueous solution is dark blue in colour and dichroic. On the addition of an acid, a pale cream-coloured precipitate of the phthalein is produced; when an excess of sodium hydroxide solution is added, the mixture acquires a purple colour which subsequently disappears.

Soluble in water (1 in 7); slightly soluble in alcohol (90 per cent.)

Standard, B.P.—Iodophthalein contains not less than 85 per cent. of phthalein, and the separated phthalein contains not less than 61 per cent. and not more than 62 per cent. of iodine. It complies also with a limit test for free phthalein.

Action and Uses.—Iodophthalein taken internally is excreted by the liver into the gall bladder, rendering it opaque to X-rays, the administration thus being an aid to diagnosis The patient is prepared by purgatives forty hours before the examination, and the salt can be given by mouth or intravenous injection.

For the oral method, the patient is given a fat-free meal in the evening, followed thirty minutes later by a drachm of sodium bicarbonate in water to neutralise free acid in the stomach. After this the salt is given in a solution of 4·25 per cent. citric acid, or in grape or orange juice, and radiographs are obtained fourteen to eighteen hours later.

When the stomach is too irritable to retain the salt, the intravenous method may be used; the dose, usually about 3 grammes for an adult, is dissolved in 40 millilitres of sterilised, triply-distilled water, and is given slowly in one injection warmed to body temperature The solution must be freshly prepared immediately before use. Care must be taken that there is no extravenous leakage since the drug is very irritant to the tissues. Adrenaline solution, 1 in 1000, should be kept at hand in case of collapse, when 10 minims should be given subcutaneously. Films are exposed eight, ten and twelve hours later. The solution should be brilliantly transparent and dichroic; the slightest trace of acid will cause a cloudy deposit. A solution for **injection** may be sterilised by tyndallisation or by filtration, and the containers should comply with the tests for limit of alkalinity of glass

Dose.– 0·04 to 0·06 gramme per kilogram of body weight up to 5 grammes ($\frac{1}{3}$ to $\frac{1}{2}$ grain per pound of body weight up to 75 grains); up to 3 grammes (45 grains), by intravenous injection

IODUM
(Iod.)
Iodine
I = 126·9

Iodine is a solid, non-metallic element, which may be obtained from the mother liquors of Chili saltpetre. The mother liquors contain traces of sodium iodate, from which the iodine is liberated by treatment with sodium pyrosulphite. It may also be obtained from the ashes of seaweed (kelp), in which it occurs as sodium and potassium iodides, by lixiviating and distilling the crude iodides thus obtained with manganese dioxide and sulphuric acid. It is purified by sublimation with potassium iodide; when prepared from kelp, the first portion of the sublimate is liable to contain iodine cyanide

Iodine occurs in heavy, bluish-black, brittle, rhombic prisms, or in plates having a metallic lustre, a distinctive penetrating odour and an acrid taste. The solution in alcohol, ether, or aqueous solutions of iodides is reddish-brown; in chloroform or carbon disulphide it is violet-coloured. In contact with the skin it produces a deep reddish-brown stain, which may be removed readily by solutions of alkalis or of sodium thiosulphate. Iodine is slowly volatile at ordinary temperatures; on heating, it is completely volatilised, giving off violet-coloured vapours which may be condensed as a bluish-black, crystalline sublimate. One drop of a dilute solution of iodine in potassium iodide gives with a solution of starch a deep blue colour, which disappears on boiling and re-appears on cooling. Iodine should be **stored** in a well-stoppered bottle, or in a glass or earthenware container with a well-waxed bung.

Slightly **soluble** in water; soluble in alcohol (90 per cent.) (1 in 12), ether (1 in 4), chloroform (1 in 30), carbon disulphide (1 in 6) and glycerin (1 in 65); very soluble in concentrated aqueous solutions of potassium iodide.

Standard, B.P.—Iodine contains not less than 99·5 per cent. of I. Residue on volatilisation on a water-bath, not more than 0·05 per cent. It complies also with limit tests for cyanogen and for other halogens

Action and Uses.—Iodine is absorbed into the circulation through the skin, and appears as iodide in the urine. Liquor Iodi Simplex is **administered** in progressive doses in milk in the treatment of chronic rheumatism, in cases of hypothyroidism, and as a preoperative measure in hyperthyroidism. Doses of 0·12 to 0·2 millilitre (2 to 3 minims) of Liquor Iodi Mitis are sometimes given to check vomiting, but, even in small doses, preparations containing potassium iodide may cause symptoms of iodism, namely, nasal catarrh, gastric irritation, and lachrymation. Compounds of iodine with sesame oil are administered by hypodermic injection in the treatment of rheumatoid arthritis, pulmonary diseases and syphilis. Intravenous injection of iodine, well-diluted with physiological sodium chloride solution, has been employed in pneumonia and septicæmia. The dose for this

purpose is 0·6 to 1·0 millilitre of Liquor Iodi Aquosus in 10 millilitres of physiological sodium chloride solution.

Preparations of iodine are applied **externally** as parasiticides and counter-irritants; strong solutions produce desquamation, or, if repeatedly applied, some degree of vesication. A solution of iodine (2 per cent. in 70 per cent. alcohol) is painted on the skin to procure asepsis at the site of operation; when industrial methylated spirit is used for this preparation it must be free from acetone. Weak solution of iodine is an excellent antiseptic in emergencies for general application to wounds and raw surfaces to prevent sepsis. Liquor Iodi Fortis is applied as a paint to destroy tinea and other parasitic fungi, and is used also as a mild and prolonged counter-irritant. If applied to enlarged glands, or joints swollen by chronic inflammation, solutions of iodine cause the absorption of inflammatory products. A stronger tincture of iodine, known as Churchill's tincture of iodine, contains 16·5 per cent. w/v of iodine and 3·3 per cent. w/v of potassium iodide in 25 per cent. v/v of water and alcohol (95 per cent.). Liquor Iodi Oleosa is less liable to cause cracking of the skin than a non-oily solution. Unguentum Iodi, Unguentum Iodi Denigrescens and Parogenum Iodi are used as mild counter-irritants for application to chilblains and to reduce swellings. Collodium Iodi is used as an application to ringworm, chilblains and swollen glands. Pigmentum Iodi et Aconiti is applied to the gums as an antiseptic and anodyne.

For **inhalation,** a few drops of the weak solution are added to hot water, often with the addition of creosote or phenol, and the vapour inhaled in phthisis and chronic bronchitis. Vapor Iodi Æthereus is used on the absorbent pad or sponge of an oro-nasal respirator inhaler, and is employed in phthisis and chronic expectoration. Nebula Iodi Composita, Nebula Iodi et Mentholis and Pigmentum Iodi Compositum are useful applications for the throat. Iodine forms a loose compound with starch, and is sometimes administered or applied in this form (Amylum Iodisatum, 1 in 20). Colourless preparations of iodine are misnamed, since iodine only becomes decolourised on entering into chemical combination with other bodies, hence the medicinal virtues of iodine as such must be considerably modified. Iodised oils, or iodine in combination with vegetable oils, are used as opaque media in X-ray diagnosis.

Iodine is **incompatible** with alkalis and alkali carbonates, oil of turpentine and most volatile oils, tannin and vegetable astringents. With acetone it forms a pungent and irritating compound. The antidotes to iodine **poisoning** are large draughts of milk, mucilage of starch or wheaten flour mucilage, followed by stimulants, warmth to the extremities, and strychnine hypodermically.

Preparations

Collodium Iodi, B.P.C.—(Collod. Iod.)—Iodine Collodion. Iodine, about 1 in 15, in flexible collodion.

Liquor Iodi Æthereus, B.P.C.—(Liq. Iod. Æther.)—Ethereal Solution of Iodine. *Syn.*—Tinctura Iodi Ætherea; Ethereal Tincture of Iodine. Iodine, 1 in 40, in ether.

Liquor Iodi Aquosus, B.P.C.—(Liq. Iod. Aq.)—Aqueous Solution of Iodine. *Syn.*—Lugol's Solution. Iodine, 5 per cent. w/v, and potassium iodide in distilled water. Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

Liquor Iodi Decoloratus, B.P.C.—(Liq. Iod. Decol.)—Decolourised Solution of Iodine. *Syn.*—Tinctura Iodi Decolorata; Decolourised Tincture of Iodine. An ammoniacal alcoholic solution containing ammonium iodide and ammonium iodate equivalent to about 3 per cent. w/v of iodine and 6·25 per cent. v/v of strong solution of ammonia.

Liquor Iodi Fortis, B.P.—(Liq. Iod. Fort.)—Strong Solution of Iodine. *Syn.*—Tinctura Iodi Fortis; Strong Tincture of Iodine. It contains 10 per cent. w/v of iodine (limits, 9·8 to 10·2) and 6 per cent. w/v of potassium iodide (limits, 5·8 to 6·2) in distilled water and alcohol (90 per cent.). It should be stored in well-closed, glass-stoppered bottles.

Solutio iodi spirituosa I.A. is prepared with iodine, 6·5 grammes, potassium iodide or sodium iodide, 2·5 grammes, and alcohol (90 per cent.), 91 grammes.

Liquor Iodi Mitis, B.P.—(Liq. Iod. Mit.)—Weak Solution of Iodine. *Syn.*—Tinctura Iodi Mitis; Weak Tincture of Iodine; Tinctura Iodi; Tincture of Iodine. It contains 2·5 per cent. w/v of iodine (limits, 2·45 to 2·55) and 1·5, per cent. w/v of potassium iodide (limits, 1·45 to 1·55) in distilled water and alcohol (90 per cent.). 2 millilitres contains 0·05 gramme of free iodine and about 0·07 gramme of total iodine; 30 minims contains about $\frac{1}{8}$ grain of free iodine and about 1 grain of total iodine. It should be stored in well-closed, glass-stoppered bottles. Dose.– 0·3 to 2 millilitres (5 to 30 minims)

Liquor Iodi Oleosus, B.P.C.—(Liq. Iod. Oleos.)—Oily Solution of Iodine. *Syn.*—Tinctura Iodi Oleosa; Oily Tincture of Iodine. Iodine, 8 per cent. w/v, and castor oil, 16·25 per cent. v/v, in alcohol (90 per cent.).

Liquor Iodi Simplex, B.P.—(Liq. Iod. Simp.)—Simple Solution of Iodine. A solution containing 9 per cent. w/v of total iodine in alcohol (95 per cent.) (limits, 8·8 to 9·2), corresponding approximately to 10 per cent. w/w of total iodine. 1 millilitre contains 0·09 gramme, and 15 minims about $1\frac{1}{2}$ grains, of total iodine. It is of the same strength as Tinctura Iodi (French Codex, 1908). It should be stored in well-closed bottles, in a cool place and protected from light. When stored, the proportion of free iodine decreases owing to interaction with the alcohol. Dose.– 0·2 to 1 millilitre (3 to 15 minims).

Nebula Iodi Composita, B.P.C.—(Neb. Iod. Co.)—Compound Iodine Spray. Iodine, 1 per cent. w/v, and phenol, 0·5 per cent. w/v, in light liquid paraffin

Nebula Iodi et Mentholis, B.P.C.—(Neb. Iod. et Menthol.)—Iodine and Menthol Spray. Iodine, 2 per cent. w/v, and menthol, 4 per cent. w/v, in light liquid paraffin.

Parogenum Iodi, B.P.C.—(Parogen. Iod.)—Iodine Parogen. *Syn.*—Iodine Vasoliment; Linimentum Iodi Petrolatum. Iodine, about 10 per cent w/v, with oleic acid, liquid paraffin and ammoniated alcohol.

Phenol Iodisatum, B.P.C.—(Phenol Iodisat.)—Iodised Phenol. *Syn.*—Iodised Carbolic Acid. Iodine, 10 per cent. w/v, in liquefied phenol.

Pigmentum Iodi Compositum, B.P.C.—(Pig. Iod. Co.)—Compound Iodine Paint. *Syn.*—Mandl's Paint. Iodine, 1·25 per cent. w/v, with potassium iodide and oil of peppermint, in glycerin.

Pigmentum Iodi et Aconiti, B.P.C.—(Pig. Iod. et Aconit.)—Iodine and Aconite Paint. Weak solution of iodine and strong tincture of aconite, equal parts.

Pigmentum Olei Picis cum Iodo, B.P.C.—(Pig. Ol. Pic. c. Iod.)—Oil of Tar and Iodine Paint. *Syn.*—Pigmentum Picis cum Iodo; Pasta Iodi et Picis; Coster's Paste. Iodine, about 20 per cent. w/v, in rectified oil of tar

Syrupus Iodotannicus, B.P.C.—(Syr. Iodotann.)—Iodotannic Syrup. Iodine and tannic acid, of each 1 per cent. w/w, in syrup and syrup of lemon. Dose.– 1 to 4 millilitres ($\frac{1}{4}$ to 1 fluid drachm).

Syrupus Iodotannicus cum Phosphate, B.P.C.—(Syr. Iodotann. c. Phosph.)—Iodotannic Syrup with Phosphate. Each fluid drachm contains about 2½ grains of calcium phosphate in iodotannic syrup. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Unguentum Iodi, B.P.C.—(Ung. Iod.)—Iodine Ointment. Iodine, 4 per cent., potassium iodide and distilled water in simple ointment.

This ointment, prepared with glycerin, 12 per cent. w/w, and lard, 80 per cent. w/w, instead of the distilled water and simple ointment, was included in the British Pharmacopœia, 1914.

Unguentum Iodi Denigrescens, B.P.C.—(Ung. Iod. Denig.)—Non-Staining Iodine Ointment Iodine, 5 per cent., with arachis oil and yellow soft paraffin.

Vapor Iodi Æthereus, B.P.C.—(Vap. Iod. Æther.)—Ethereal Inhalation of Iodine. Ethereal solution of iodine, 25 per cent. v/v, phenol, 25 per cent. w/v, and creosote, 12·5 per cent. v/v, in alcohol (90 per cent.).

IPECACUANHA

(Ipecac.)

Ipecacuanha

Synonyms—Ipecacuanhæ Radix; Ipecacuanha Root.

Ipecacuanha consists of the dried root of *Cephaëlis Ipecacuanha* (Brot.) A. Rich. (Fam. Rubiaceæ), a small plant indigenous to Brazil, and cultivated both there and in Selangor (Federated Malay States), Bengal and Burma. The plant grows in small clumps, and produces fibrous roots, many of which develop a greatly thickened bark containing much starch, the wood remaining small; these enlarged roots are collected and dried.

The root occurs in slender, somewhat tortuous pieces, rarely exceeding 16 centimetres in length or 6 millimetres in thickness, and varying in colour from dark brick-red, partly due to the presence of adhering earth, to dark brown; it shows characteristic annulations, resembling wedge-shaped discs, from one to two millimetres wide, and closely applied to one another; the projecting ridges are rounded. The fracture is short and even. The smoothed transverse surface shows a thick, dark grey bark, usually horny but sometimes starchy, and a small dense wood but no pith Ipecacuanha has a faint odour and a bitter taste.

The diagnostic **microscopical** characters are the narrow, elongated cork cells; the abundant, thin-walled parenchyma of the bark, mostly filled with starch grains, but including scattered cells containing bundles of acicular crystals of calcium oxalate, 30 to 80 microns long, the starch grains being simple, or more usually compound, individual grains being oval or rounded, and not more than 15 microns in diameter, the compound grains containing from 2 to 5, or up to 8, components; the perforated tracheids, small vessels and fibres of the xylem; the lignified, fibrous parenchyma of the medullary rays and the

xylem parenchyma, many cells of which contain starch; the absence of large vessels, sclerenchymatous cells and phloem fibres.

Ipecacuanha **contains** the two alkaloids, emetine and cephaëline, and small proportions of psychotrine, methylpsychotrine and emetamine. The root contains, in addition, ipecacuanhic acid, the glycoside, ipecacuanhin, and much starch. The total alkaloid present varies in good samples of the root from 2 to 3 per cent. Of this total alkaloid, about 60 to 70 per cent. is emetine and about 26 per cent. is cephaëline, while psychotrine, methylpsychotrine and emetamine form only about 2 per cent.

Varieties.—The commonest commercial variety is known as Rio ipecacuanha and is imported from Matto Grosso in Brazil. Minas ipecacuanha, from the province of Minas Geraes in Brazil, is similar, but is usually more carefully cleaned. Indian ipecacuanha and Johore ipecacuanha cultivated in the Federated Malay States closely resemble the Rio variety and contain about the same proportion of total alkaloids.

Substitutes.—Cartagena ipecacuanha, which is imported from Colombia, has been attributed to *Psychotria acuminata* Benth. It closely resembles the Rio variety, but is distinguished by its larger size, by the annulations which do not completely encircle the root but take the form of numerous distinct transverse ridges, and by the larger starch grains, which often measure from 17 to 22 microns. Cartagena ipecacuanha contains approximately the same quantity of total alkaloid, of which, however, about 30 to 40 per cent. is emetine. Ipecacuanha stems occur in rather large proportion in some samples of the root; they exhibit no annulations, but are slender and striated longitudinally. They may be distinguished from the root by the presence of a distinct pith, composed of cells with lignified walls; microscopically, they may be identified by the presence of spiral vessels from the xylem and of scerenchymatous cells The stem usually contains a smaller proportion of alkaloid than the root The so-called East Indian ipecacuanha is the rhizome of a small monocotyledonous plant, probably *Cryptocoryne spiralis* Fisch. (Fam. Araceæ), imported from Southern India. It occurs in short pieces up to 5 centimetres long, many of which terminate in a bud and bear encircling leaf-scars; they have a slightly annulated appearance, but are readily distinguished by their monocotyledonous structure and the absence of a central woody core. Lesser striated ipecacuanha is derived from *Manettia ignita* (Vell.) Schum. (Fam. Rubiaceæ); it has a violet-coloured bark and the porous wood contains typical vessels. Greater striated ipecacuanha, from *Psychotria emetica* Mutis (Fam. Rubiaceæ). is similar to the preceding, but contains no starch, it being replaced by sugar in the bark. It possesses a dense wood devoid of large vessels. Undulated ipecacuanha, from *Richardsonia scabra* St. Hil. (Fam. Rubiaceæ), occurs in tortuous pieces which bear transverse lateral fissures; it has a porous wood and a starchy, often violet, cortex. White ipecacuanha, derived from *Hybanthus Ipecacuanha* (Linn.) Baill. (Fam. Violaceæ), is distinguished by its yellowish colour, the absence of annulations, and the porous wood

Standard, B.P.—Ipecacuanha contains not less than 2 per cent. of the total alkaloids of ipecacuanha, calculated as emetine, of which not less than two-thirds consists of non-phenolic alkaloids, calculated as emetine. It contains not more than 5 per cent. of stems and not more than 1 per cent. of foreign organic matter. Ash, not more than 5·5 per cent.

Ipecacuanha, in powder, contains the constituents, and possesses the diagnostic microscopical characters of Ipecacuanha, and complies with the limits for alkaloids and ash of the unground drug. When

powdered ipecacuanha is prescribed, the standardised powder, Ipecacuanha Pulverata, must be used.

Action and Uses.—The properties of ipecacuanha are virtually those of its principal alkaloids, emetine and cephaëline. In small quantity, it is a powerful expectorant, its action lasting several hours. Large quantities are irritant to the whole gastro-intestinal tract, and produce vomiting and diarrhœa. The powdered drug is irritating to the nasal and laryngeal mucous membrane, causing violent sneezing and coughing. Ipecacuanha is **administered** as Ipecacuanha Pulverata. It is used in small doses as an expectorant in acute and chronic bronchitis, and in cough when secretion is scanty. It is well tolerated by children and is used in croup and whooping cough. Large doses are used for their emetic action, which is exerted in twenty to thirty minutes. Doses of 1 to 4 grammes (¼ to 1 drachm) accompanied by opium if retention is difficult are given in amœbic dysentery. The mode of action of ipecacuanha in this respect is not clearly known.

Ipecacuanha, administered by the mouth, destroys amœbæ on the surface of the bowel wall, and therefore prevents cyst formation, but it does not affect amœbæ in the substance of the bowel wall. Usually 1·3 grammes (20 grains) of powdered ipecacuanha is given at bedtime, sometimes with morphine and tannic acid, and emetine hydrochloride is injected during the day. For children and for general use as an expectorant, Tinctura Ipecacuanhæ and Acetum Ipecacuanhæ are commonly used. To produce diaphoresis in the treatment of incipient colds, Pulvis Ipecacuanhæ et Opii is most suitable in the form of powder, pill, tablet or cachet. For this purpose and for use in acute dysentery, powdered ipecacuanha freed from emetine has been recommended, but the untreated drug is preferable. Lozenges of ipecacuanha and of ipecacuanha with morphine, and pills of ipecacuanha and squill, are prepared for use in cough. Vinum Ipecacuanhæ of the British Pharmacopoeia, 1914, was prepared by mixing 5 parts of liquid extract of ipecacuanha with 95 parts of sherry, setting aside for forty-eight hours and filtering.

Preparations

Acetum Ipecacuanhæ, B.P.C.—(Acet. Ipecac.)—Vinegar of Ipecacuanha. Liquid extract of ipecacuanha, 1 in 20, with alcohol, acetic acid and water. It contains approximately 0·1 per cent. of the alkaloids of ipecacuanha and is of the same strength as Tinctura Ipecacuanhæ. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Elixir Ipecacuanhæ, B.P.C.—(Elix. Ipecac.)—Elixir of Ipecacuanha. Liquid extract of ipecacuanha, 1 in 20, with alcohol (90 per cent.), glycerin, simple elixir and distilled water. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Extractum Ipecacuanhæ Liquidum, B.P.—(Ext. Ipecac. Liq.)—Liquid Extract of Ipecacuanha. It is prepared with alcohol (90 per cent.), concentration being effected under reduced pressure at a temperature not exceeding 60°. It is adjusted to contain 2 per cent. w/v of the total alkaloids of ipecacuanha, calculated as emetine (limits, 1·9 to 2·1); 0·12 millilitre contains 0·0024 gramme, and 2 minims contains about $\frac{1}{27}$ grain, of the total alkaloids of ipecacuanha, calculated as emetine. Dose.– 0·03 to 0·12 millilitre (½ to 2 minims). Emetic dose.– 0·6 to 2 millilitres (10 to 30 minims).

Ipecacuanha Pulverata, B.P.—(Ipecac. Pulverat.)—Powdered Ipecacuanha. *Syn.*—Powdered Ipecacuanha Root; Pulvis Ipecacuanhæ. Ipecacuanha, reduced to a fine powder and adjusted with lactose, or with ipecacuanha of suitable alkaloidal content, to contain 2 per cent. of the total alkaloids of ipecacuanha, calculated as emetine (limits, 1·9 to 2·1), of which not less than two-thirds consists of non-phenolic alkaloids, calculated as emetine. 0·12 gramme contains 0·0024 gramme, and 2 grains contains about $\frac{1}{25}$ grain, of the total alkaloids of ipecacuanha, calculated as emetine. Ash, not more than 5·5 per cent. It should be stored in well-closed containers. Dose.– 0·03 to 0·12 gramme ($\frac{1}{2}$ to 2 grains); emetic dose, 1 to 2 grammes (15 to 30 grains).

Pulvis Ipecacuanhæ I.A. contains 2 per cent. of total alkaloids.

Linctus Diamorphinæ cum Ipecacuanha, B.P.C.—(Linct. Diamorph. c. Ipecac.)—Linctus of Diamorphine with Ipecacuanha. Each fluid drachm contains $\frac{1}{200}$ grain of diamorphine hydrochloride and $\frac{3}{4}$ minim of liquid extract of ipecacuanha, with tincture of hyoscyamus, spirit of chloroform, syrup of tolu, syrup of wild cherry and glycerin. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Mistura Ipecacuanhæ Composita, B.P.C.—(Mist. Ipecac. Co.)—Compound Ipecacuanha Mixture. *Syn.*—Mistura Expectorans. Each fluid ounce contains 24 minims of vinegar of ipecacuanha, 15 minims of strong solution of ammonium acetate and 15 minims of oxymel of squill, with glycerin and chloroform water. Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

Pilulæ Ipecacuanhæ cum Scilla, B.P.C.—(Pil. Ipecac. c. Scill.)—Ipecacuanha Pills with Squill. Each pill contains 2 grains of powder of ipecacuanha and opium, and $\frac{2}{3}$ grain each of squill and ammoniacum. Dose.– 1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914, under the name of Pilula Ipecacuanhæ cum Scilla.

Pulvis Ipecacuanhæ et Opii, B.P.—(Pulv. Ipecac. et Opii.)—Powder of Ipecacuanha and Opium. *Syn.*—Pulvis opii et Ipecacuanhæ compositus I.A.; Pulvis Ipecacuanhæ Compositus; Compound Powder of Ipecacuanha; Dover's Powder. Powdered ipecacuanha and powdered opium, of each 10 per cent., with lactose. It contains 1 per cent. of anhydrous morphine (limits, 0·95 to 1·05); 0·6 gramme contains 0·006 gramme, and 10 grains contains $\frac{1}{10}$ grain, of anhydrous morphine. Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Syrupus Ipecacuanhæ, B.P.C.—(Syr. Ipecac.)—Syrup of Ipecacuanha. Vinegar of ipecacuanha, 1 in 2, with sucrose and distilled water. Dose.– 2 to 8 millilitres ($\frac{1}{2}$ to 2 fluid drachms).

Sirupus Ipecacuanhæ I.A. contains 10 per cent. of Tinctura Ipecacuanhæ I.A.

Tabellæ Acidi Acetylsalicylici et Opii, B.P.C.—(Tab. Acid. Acetylsalicyl. et Opii)—Tablets of Acetylsalicylic Acid and Opium. *Syn.*—Tablets of Aspirin and Dover's Powder. Each tablet contains $2\frac{1}{2}$ grains of acetylsalicylic acid and $2\frac{1}{2}$ grains of powder of ipecacuanha and opium. Dose.– 1 to 3 tablets.

Tabellæ Acidi Acetylsalicylici et Opii Compositæ, B.P.C.—(Tab. Acid. Acetylsalicyl. et Opii Co.)—Compound Tablets of Acetylsalicylic Acid and Opium. Each tablet contains 3 grains of acetylsalicylic acid, $1\frac{1}{4}$ grains of phenacetin and 1 grain of powder of ipecacuanha and opium. Dose.– 1 to 4 tablets.

Tabellæ Aloini Compositæ, B.P.C.—(Tab. Aloin. Co.)—Compound Aloin Tablets. Each tablet contains $\frac{1}{4}$ grain of aloin, $\frac{1}{4}$ grain of ipecacuanha and $\frac{1}{8}$ grain of dry extract of nux vomica. Dose.– 1 or 2 tablets.

Tinctura Ipecacuanhæ, B.P.—(Tinct. Ipecac.)—Tincture of Ipecacuanha. Liquid extract of ipecacuanha, 5 per cent. v/v, in alcohol (90 per cent.), glycerin and distilled water. It contains 0·1 per cent. w/v of the total alkaloids of ipecacuanha, calculated as emetine (limits, 0·095 to 0·105); 2 millilitres contains 0·002 gramme, and 30 minims contains about $\frac{1}{37}$ grain, of alkaloid. Tincture of ipecacuanha replaces Vinum Ipecacuanhæ, Ipecacuanha Wine, of the British

Pharmacopœia, 1914, and contains the same proportion of liquid extract. When Vinum Ipecacuanhæ or Ipecacuanha Wine is prescribed or demanded, Tinctura Ipecacuanhæ must be dispensed or supplied. Doses.– 0·6 to 2 millilitres (10 to 30 minims); emetic dose, 15 to 30 millilitres (½ to 1 fluid ounce).

Tinctura Ipecacuanhæ I.A. is prepared with alcohol (70 per cent.) and contains 0·2 per cent. of total alkaloids.

Trochisci Ipecacuanhæ, B.P.C.—(Troch. Ipecac.)—Ipecacuanha Lozenges. Each lozenge contains ¼ grain of powdered ipecacuanha.

This lozenge, containing 0·015 gramme of powdered ipecacuanha, was included in the British Pharmacopœia, 1914.

Trochiscus Morphinæ et Ipecacuanhæ, B.P.—(Troch. Morph. et Ipecac.)—Lozenge of Morphine and Ipecacuanha. *Syn.*—Morphine and Ipecacuanha Lozenge. Each lozenge contains approximately 0·002 gramme or $\frac{1}{32}$ grain of morphine hydrochloride and approximately 0·006 gramme or $\frac{1}{10}$ grain of powdered ipecacuanha.

IPOMŒA

(Ipom.)

Ipomœa

Synonyms—Ipomœæ Radix; Orizaba Jalap Root; Mexican Scammony Root; Male Jalap; Stalk Jalap.

Ipomœa is the dried root of *Ipomœa orizabensis* (Pellet.) Ledanois. (Fam. Convolvulaceæ), a climbing plant indigenous to the Mexican Andes.

The large, tuberous roots are 18 to 25 centimetres long and 9 to 10 centimetres at the widest part; they are cylindrical-fusiform, grey-brown or brownish-black, and strongly wrinkled longitudinally. The entire roots sometimes occur in commerce, and are often deeply incised longitudinally. More commonly, the tubercles are cut into transverse slices or wedge-shaped pieces, from about 1 to 4 centimetres thick and 5 to 8 centimetres wide; the transverse surface of the slices is earthy-grey, and exhibits irregular concentric circles of pale brown, projecting, fibrous vascular strands. The dried slices are very hard and tough, and break transversely with difficulty, the fracture being short, resinous and irregular The odour is slight, and the taste resinous and acrid.

The diagnostic **microscopical** characters are the abundant starch grains, mostly muller-shaped components of compound grains, which possess 2 to 5 components, a few rounded grains, the hilum, being central, and individual grains measuring up to 35 microns; numerous cluster-crystals of calcium oxalate, about 15 to 45 microns in diameter; occasional prisms of calcium oxalate; numerous fibres and vessels with bordered pits; greyish-brown resin cells which stain deep yellow with iodine water

Ipomœa **contains** from about 10 to 20 per cent. of resin, of which a variable proportion (60 to 95 per cent.) is soluble in ether On hydrolysis

the resin yields dextrose, methylpentose, jalapinolic acid, and methyl-jalapinolate and appears, therefore, to consist mainly of the glycoside and methylpentoside of jalapinolic acid and its methyl ester. It also contains β-methylæsculetin, dihydroxycinnamic acid, fatty acids, phytosterol, starch, calcium oxalate, etc. Boiled with potassium hydroxide solution, the resin is dissolved, but is not reprecipitated on acidifying the solution.

Standard, B.P.—Ipomœa, yields to alcohol (90 per cent.) a resin which after washing with water, has the properties described under Scammoniæ Resina.

Ipomœa, in powder (Pulvis Ipomœæ : Pulv. Ipom.), contains the constituents and possesses the diagnostic microscopical characters of Ipomœa, and complies with the standard for the unground drug.

Action and Uses.—Ipomœa is a drastic purgative, and is usually administered in the form of its resin.

Dose.—0·3 to 1·2 grammes (5 to 20 grains).

SCAMMONIÆ RADIX.—Scammony root consists of the dried root of *Convolvulus Scammonia* Linn. (Fam. Convolvulaceæ), a climbing plant indigenous to the Eastern Mediterranean. The root is brownish-grey or yellowish-grey, hard, heavy and woody. It is sub-cylindrical or slightly tapering, varying from 2 to 10 centimetres in diameter and 15 centimetres to 1 metre in length often spirally twisted, contorted, longitudinally furrowed, and crowned with the short remains of numerous aerial stems; the fracture is very coarsely fibrous. The smoothed, transversely cut surface is light in colour and exhibits numerous more or less circular cambia with porous xylem internally and phloem externally the phloem being dotted with resin cells, which appear as dark points under a pocket lens the parenchymatous tissue, in which these structures are embedded, contains abundant starch. The starch of scammony root is in small grains, which are usually compound (two, three, or four constituents); the isolated, component starch grains are conical or muller-shaped, and usually exhibit a V-shaped, or radiately cleft, hilum; the large grains measure about 20 to 25 microns. The odour is characteristic, and the taste is sweetish and slightly acrid. The root contains from 3 to 13 per cent. (average about 8 per cent.) of resin together with dihydroxycinnamic acid, β-methylæsculetin, ipuranol, sucrose, a reducing sugar and starch. The resin consists mainly of the glycosides and methylpentosides of jalapinolic acid and its methyl ester; it is hydrolysed by caustic alkali, with the production of jalapinolic, methylbutyric, tiglic, formic and other acids, together with rhamnose: it is almost entirely soluble in ether. Scammony root is now rarely used except for preparing scammony (Scammonium), scammony resin (Scammoniæ Resina) being now obtained from Ipomœa.

IRIDIS RHIZOMA

(Irid. Rhiz.)

Orris

Synonym—Orris Root.

Orris consists of the rhizome of *Iris germanica* Linn., *I. pallida* Lam. and *I. florentina* Linn. (Fam. Iridaceæ), all of which are cultivated in Italy. The rhizomes are collected in the late summer, freed from the roots, growing portions, etc., peeled and slowly dried.

The rhizome occurs usually in hard and compact pieces from 5 to 10 centimetres long and about 2 to 3 centimetres wide. It is pale cream in colour, slightly flattened dorsiventrally, and exhibits enlargements and contractions, each enlargement representing one year's growth; one or two short branches are usually attached to the larger extremity. The under surface bears numerous conspicuous, circular root-scars, and the upper surface indistinct leaf-scars, or traces of the fibrovascular bundles which have passed from leaf to rhizome. The smoothed transverse surface shows a comparatively narrow cortex, separated by a brownish endodermis from the large stele, which is pale cream in colour, and exhibits numerous scattered vascular bundles, and here and there small, shining crystals of calcium oxalate. The fresh rhizome is almost odourless, the characteristic odour developing during the drying process and subsequent storage.

The diagnostic **microscopical** characters are the abundant starch grains, mostly simple, about 25 to 30 microns long and 10 to 25 microns wide, oval or elliptical in outline, and with a distinct, radiate hilum; large prismatic crystals, about 250 by 30 microns, of calcium oxalate; thick-walled parenchymatous tissue; the absence of bast-fibres.

Orris **contains** a volatile substance, known as concrete oil of orris, or butter of orris, 0·1 to 0·2 per cent., pale yellow, and solid at ordinary temperatures (melting-point, about 40°), and composed of about 85 per cent. of myristic acid, the remaining 15 per cent. being a mixture of irone, oleic acid, methyl myristate, and other esters. Irone, $C_{13}H_{20}O$, is an oily liquid with a pungent odour, quite distinct from that of violets until largely diluted. The rhizome also contains a crystalline glycoside, iridin (which must be distinguished from the resinoid, iridin, obtained from iris), abundance of starch, and a little resin. The ash of orris is usually from 2 to 4 per cent.

Varieties.—The finest variety, Florentine orris, occurs in bold, pale coloured, carefully peeled pieces of very fragrant odour. Verona orris occurs in thinner, less carefully peeled pieces, slightly darker in colour, many pieces having a hole at one end by which they have been suspended during the drying process. The odour is not so fragrant as that of the Florentine variety.

Substitutes.—Mogador orris is much darker in colour than Italian orris, and exhibits portions of reddish cork and the remains of buds. Indian orris is small, generally unpeeled, and has little aroma.

Action and Uses.—In large doses, orris acts as a cathartic. The powder is a common ingredient of toilet powders and is occasionally used in dental preparations. Pieces of the rhizome are given to infants to bite on in order to assist dentition. The volatile oil of orris is extensively used for blending with ionone as a base for violet perfumes. A syrup commonly known as "syrup of violets" (Syrupus Violæ) is usually prepared from tincture of orris and coloured with a violet dye.

IONONUM.—Ionone is a mixture of two isomeric ketones, α and β, of the formula $C_{13}H_{20}O$, obtained from citral or oil of lemon grass by condensation with acetone in the presence of an alkali, the pseudo-ionone so produced being treated with sulphuric acid. The commercial product varies somewhat in odour and other

properties according to the proportion of the two isomers present. When pure it occurs as a colourless liquid, but in commerce it is usually greenish-yellow. It has a specific gravity of about 0·935 and a boiling-point of about 126° under 10 mm. pressure. When well diluted it has a powerful violet-like odour. Ionone gives an intense golden-yellow colouration on treatment with hydrochloric acid, the colour changing to dirty violet on adding chloral hydrate and heating. The violet colour is destroyed on shaking the cold liquid with ether. Ionone and other related compounds, such as methyl-ionone, are largely used in perfumery.

METHYLHEPTINÆ CARBONAS.— Methylheptine carbonate, $CH_3(CH_2)_4 \cdot C\ C \cdot COOCH_3$, may be prepared synthetically from the ricinoleic acid occurring in castor oil. It occurs as a colourless, mobile liquid, having a specific gravity of about 0·952 and a boiling-point of 107° under 20 mm. pressure. When pure it has a strong, penetrating, disagreeable odour but when highly diluted it has a fine, persistent violet-like odour. Methylheptine carbonate and other compounds of somewhat similar composition are used in perfumery.

IRIS
(Iris)
Iris

Synonym—Blue Flag.

Iris consists of the dried rhizome and roots of *Iris versicolor* Linn. (Fam. Iridaceæ), a herbaceous perennial growing in marshy ground in Eastern and Central North America.

The drug occurs in pieces usually from 5 to 20 centimetres long and 1 to 2·5 centimetres thick, cylindrical in the older part, but for the most part flattened dorsiventrally and divided by slight constrictions, about 3 to 5 centimetres apart, into more or less enlarged portions. Externally it is reddish-brown, wrinkled longitudinally, and bears annular markings; the lower surface shows very numerous root-scars, or, occasionally, transversely wrinkled roots; the upper surface bears leaf-scars. The fracture is short, varying in colour from cream to purplish-brown, and exhibits pale fibrovascular bundles scattered throughout the stele. The odour is slight, and the taste pungent and acrid.

Iris **contains** a resinoid, iridin (which must be distinguished from the glycoside, iridin, contained in *Iris florentina* Linn.), *iso*phthalic acid and a trace of salicylic acid; small amounts of starch and tannin are also present. The rhizome yields to alcohol (60 per cent.) about 25 per cent. of extractive.

Action and Uses.—Iris exerts a cathartic action and is given in the form of extract, frequently in combination with euonymin or papain.

Preparations

Extractum Iridis, B.P.C.—(Ext. Irid.)—Extract of Iris. *Syn.*—Iridin; Extractum Iridis Siccum. The alcoholic percolate evaporated to dryness and mixed with calcium phosphate. Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

Liquor Euonymini et Iridini, B.P.C.—(Liq. Euonym. et Iridin.)—Solution of Euonymin and Iridin. It contains the equivalent of about 3·5 per cent. w/v of extract of euonymus and about 2 per cent. w/v of extract of iris, with potassium carbonate, distilled water and alcohol (45 per cent.) Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Liquor Papaini et Iridini, B.P.C.—(Liq. Papain. et Iridin.)—Solution of Papain and Iridin. Each fluid drachm contains 1 grain each of papain and extract of iris, with glycerin, alcohol (90 per cent.) and chloroform water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ISPAGHULA

(Ispagh.)

Ispaghula

Synonyms—Spogel Seeds; Isafgul.

Ispaghula consists of the dried, ripe seeds of *Plantago ovata* Forsk. (Fam. Plantaginaceæ), a herbaceous annual indigenous to India and Persia.

The seeds are about 1 to 3·5 millimetres long and 1 to 1·75 millimetres wide, ovate in outline and boat-shaped; they are hard and pinkish-buff, and have a reddish-brown oval spot, about one-quarter of the length of the seed, in the centre of the convex surface; occasional seeds are uniformly reddish-brown in colour. The hilum appears as a brown spot in the centre of the hollow, which is more or less covered with a whitish membrane having two perforations, one on each side of the hilum. The endosperm is hard, and the straight embryo, which is almost as long as the seed, lies near the convex surface, and has two cotyledons with their contiguous, flattened, upper surfaces in the median plane. The epidermis is mucilaginous, and swells in water to form a translucent, colourless envelope to each seed. The taste is mucilaginous, and the odour is not marked.

The diagnostic **microscopical** characters are the polygonal cells of the epidermis, which are transparent and filled with mucilage; the thick, cellulose-walled cells of the endosperm, with numerous pits and granular contents; the thin-walled, polyhedral cells of the embryo containing fixed oil and aleurone grains.

Ispaghula **contains** mucilage as the chief constituent, and also protein, fixed oil, etc. It yields about 2·5 per cent. of ash.

Standard.—Ispaghula contains not more than 3 per cent. of foreign organic matter. One hundred seeds weigh not less than 0·17 gramme and not more than 0·22 gramme. 1 gramme, agitated gently and occasionally during twenty-four hours in a 25 millilitre stoppered-cylinder filled to the 20 millilitre mark with water, and allowed to stand for one hour, occupies a volume of not less than 10 millilitres.

Ispaghula, in powder (Pulvis Ispaghulæ : Pulv. Ispagh.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Ispaghula, when moistened with water, swells into a gelatinous mass, a property which has given rise to its use in the treatment of atony of the intestine with constipation. In the treatment of chronic diarrhœa, ispaghula may be given dry, or in the form of a decoction (Decoctum Ispaghulæ, 1·5 in 100), in doses of ½ to 2 fluid ounces.

Dose.– 3 to 10 grammes (45 to 150 grains)

ISPAGHULÆ TESTA.—Ispaghula husk consists of the epidermis removed from ispaghula. It is composed of small, transparent, colourless, brittle flakes which swell rapidly in water. Ispaghula husk contains mucilage, small traces of starch and cellulose. It is used for the same purposes as the whole seeds, but is more powerful in its action.

JABORANDI
(Jaborand.)
Jaborandi

Synonyms—Pilocarpus; Jaborandi Leaves.

Jaborandi consists of the dried leaflets of *Pilocarpus microphyllus* Stapf (Fam. Rutaceæ), a shrub indigenous to Brazil, and bearing imparipinnate leaves; it is exported from Maranham.

The leaflets are dull greenish-brown in colour, 2·5 to 4 centimetres long, punctate, obovate and asymmetrical. The margin is entire, the apex emarginate, and the base unequal; the terminal leaflets are symmetrical, with an equal base. The odour of the leaflets, when crushed, is aromatic; the taste is pungent and aromatic and, when the drug is chewed, salivation is induced.

The diagnostic **microscopical** characters are the polygonal, straight-walled, epidermal cells, the cuticle on the upper side being strongly striated; stomata on the lower surface only, each stoma being surrounded by four or five tangentially-arranged cells; occasional groups of smaller epidermal cells, which mark the insertion of inconspicuous external glands; the large, schizo-lysigenous oil glands of the mesophyll; the single layer of palisade; the cluster-crystals of calcium oxalate; the occasional, conical, thick-walled, protective hairs.

Jaborandi **contains** the alkaloids, pilocarpine, *iso*pilocarpine and pilosine, and volatile oil which has a powerful odour, recalling that of rue. Pilocarpine occurs in variable quantity, but rarely more than 0·5 per cent.

Substitutes.—The leaflets of *Pilocarpus Jaborandi* Holmes, Pernambuco jaborandi, were formerly official, but are now seldom imported. They may be distinguished by their large size, being up to 10 centimetres long; the margin is revolute and the base mostly unequal. Numerous other substitutes occur, amongst which are the leaflets of the following plants:—*P. pennatifolius* Lem., Paraguay jaborandi, official in 1885, distinguished by their greyish-green colour, length of 10 centimetres or more, less coriaceous texture, nearly equal base and small alkaloidal content; *P. Selloanus* Engler, Rio Janeiro jaborandi,

characterised by the more distinctly obovate shape; *P. trachylophus* Holmes, Ceara jaborandi, olive-green in colour, with recurved margin and abundant, short, curved hairs on the under surface; *Swartzia sp.* (Fam. Leguminosæ), the leaflets of which are distinguished by the absence of oil glands

Standard.—Jaborandi contains not more than 5 per cent. of stalks, stems and other foreign organic matter.

Action and Uses.—Preparations of jaborandi stimulate all parasympathetic nerve endings, produce broncho-constriction, increase secretion of sweat and saliva, and cause contraction of the uterus and augmentation of the movements of the gut. Preparations are occasionally added to hair lotions for their supposed effect in promoting the growth of the hair. In case of **poisoning,** atropine should be injected hypodermically, or tincture of belladonna given by the mouth.

Preparations

Extractum Jaborandi Liquidum, B.P.C.—(Ext. Jaborand. Liq.)—Liquid Extract of Jaborandi. 1 in 1.

Tinctura Jaborandi, B.P.C.—(Tinct. Jaborand.)—Tincture of Jaborandi. Liquid extract of jaborandi, 1 in 5. Dose.—0·6 to 2 millilitres (10 to 30 minims).

JALAPA
(Jalap.)

Jalap

Jalap consists of the dried tubercles of *Ipomœa purga* Hayne (Fam. Convolvulaceæ), a climbing plant indigenous to the eastern slopes of the Mexican Andes. The tubercles are dried in nets over a fire, the larger ones being cut up or incised longitudinally to facilitate the process.

The drug occurs as hard, heavy, dark brown tubercles, which are usually fusiform or napiform, and from about 3 to 15 centimetres long and 1·8 to 10 centimetres wide at the broadest part, the larger ones usually showing deep and wide incisions; more rarely the larger tubercles are cut into slices or irregular pieces. Externally, the tubercles are furrowed and wrinkled, and marked with numerous small, transverse lenticels. The smoothed transverse surface is yellowish-grey to dull brown in colour, and shows a complete ring of cambium near the outer margin and, within this ring, a number of irregularly arranged tertiary cambia, forming isolated rings and arcs or curving lines. The taste is at first sweet, but afterwards acrid and disagreeable, and the odour is characteristic.

The diagnostic **microscopical** characters are the abundant, thin-walled parenchyma of the general ground tissue, containing starch in compound grains of 2 to 6 components, and also to some extent in simple grains, individual grains measuring up to 60 microns in diameter, being commonly 30 microns; the xylem vessels with numerous bordered

pits; the numerous secretion cells of the phloem, the yellowish-brown contents of which stain yellow with solution of iodine and red with tincture of alkanna; the cluster-crystals of calcium oxalate, about 10 to 30 microns in diameter; the presence of occasional stone-cells and the absence of fibres.

Jalap **contains** resin, from about 9 to 18 per cent., sugar and starch, together with protein, calcium oxalate, etc. The ether-soluble portion of the resin of jalap is very similar to the ether-soluble portion of the resin obtained from scammony root and from ipomœa, and has been designated scammonin (orizabin). The portion insoluble in ether is jalapin, which has also been termed convolvulin, or jalapurgin. The resin is a very complex mixture; boiled with solution of potassium hydroxide it dissolves, forming the potassium salts of various water-soluble acids (formic, *d*-methylethylacetic, etc.), and when the solution is acidified the resin is not reprecipitated. Boiling with a mineral acid converts it partly into convolvulinolic (hydroxypentadecylic) and ipurolic acids and dextrose; the resin, therefore, appears to consist, in part at least, of glycosides of the two acids named.

Substitutes.—Tampico jalap is the root of *Ipomœa simulans* Hanbury; it may be distinguished by its irregular shape, convoluted surface and absence of lenticels. It yields about 10 per cent. of resin (tampicin), which is entirely soluble in ether and may be identical with the ether-soluble resin of jalap and ipomœa. Brazilian jalap is the root of *Piptostegia Pisonis* Mart. (Fam. Convolvulaceæ). It occurs in circular, transverse slices, about 3 to 5 centimetres in diameter and 1 centimetre thick, exhibiting several concentric rings and pale resin cells; it is pale greyish-brown in colour, and contains about 17 per cent. of resin, of which about 5 per cent. is soluble in ether.

Standard, B.P.—Jalap contains not more than 2 per cent. of foreign organic matter, and not less than 9 per cent. of resin.

Jalap, in powder, contains the constituents and possesses the diagnostic microscopical characters of Jalap, and complies with the limit for resin of the unground drug. When powdered jalap is prescribed, the standardised powder, Jalapa Pulverata, must be used.

Action and Uses.—Jalap is a powerful purgative, producing copious, watery evacuations. In large doses it causes considerable pain, and its preparations should not be used by those suffering from gastric or intestinal inflammation. Jalap appears to act only in the presence of bile, and the addition of soap increases its purgative power. Its action on the small intestine is very rapid, hence the liquid nature of the stools. Powdered jalap is too bulky for use in pills; for this purpose the resin is preferred. When jalap is prescribed, the standardised powder, Jalapa Pulverata, should be dispensed; it is generally **administered** as Pulvis Jalapæ Compositus. This preparation is a hydragogue cathartic employed in dropsy and chronic Bright's disease. A tincture and a compound tincture are also employed, the latter especially for use in India and the Colonies. Mixtures containing either of these tinctures require the addition of one-eighth of their volume of mucilage of acacia or mucilage of tragacanth in order to suspend the resin.

Preparations

Jalapa Pulverata, B.P.—(Jalap. Pulverat.)—Powdered Jalap. *Syn.*—Pulvis Jalapæ. Jalap, reduced to a fine powder and adjusted with powdered exhausted jalap or lactose to contain 10 per cent. of resin (limits, 9 to 11). Ash, not more than 6·5 per cent. It should be stored in well-closed containers. Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

Pulvis Jalapæ Compositus, B.P.—(Pulv. Jalap. Co.)—Compound Powder of Jalap. Powdered jalap, 30 per cent., with potassium acid tartrate and ginger. Dose.– 0·6 to 4 grammes (10 to 60 grains).

Tinctura Jalapæ, B.P.C.—(Tinct. Jalap.)—Tincture of Jalap. It contains from 1·45 per cent. to 1·55 per cent. w/v of resin. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914

Tinctura Jalapæ Composita, B.P.C.—(Tinct. Jalap. Co.)—Compound Tincture of Jalap. Jalap, 1 in 12½, with scammony resin and turpeth. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914

JALAPÆ RESINA

(Jalap. Res.)

Jalap Resin

Jalap resin is a mixture of resins obtained from jalap by extraction with boiling alcohol, evaporating the alcohol, washing the residue with water, and drying. It occurs in the form of brownish, translucent, brittle fragments, breaking with a resinous fracture, or as a pale brown powder.

Insoluble in water; soluble in alcohol.

Standard.—Jalap resin contains not less than 85 per cent. of ether-insoluble resins, calculated on the substance dried at 100°. Loss on drying at 100°, not more than 5 per cent. Ash, not more than 0·5 per cent. Shake 1 gramme, in fine powder, with 20 millilitres of cold water, filter, and wash the residue with 5 millilitres of cold water; the residue on evaporation of the filtrate and washings, after drying at 100°, weighs not more than 0·02 gramme.

Assay.—Shake vigorously for fifteen minutes 1 gramme, in fine powder, with 50 millilitres of freshly distilled ether (0·720), and allow to stand over-night; pour off the ether, wash the residue with 10 millilitres of the ether, dry at 100°, and weigh the residue of ether-insoluble resins

Action and Uses.—Jalap resin has the properties of jalap It causes evacuation more rapidly than the anthracene purgatives; the stools are watery and profuse, and evacuation may be accompanied by considerable pain and tenesmus. Jalap resin is **administered** in pills, which are best massed with syrup of liquid glucose; soap is often added to facilitate disintegration of the pill and to enhance

the action of the drug, and oleoresin of ginger may be added for its carminative effect.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

Preparation

Pilulæ Scammoniæ Compositæ, B.P.C.—(Pil. Scammon. Co.)—Compound Scammony Pills. Each pill contains 1 grain each of scammony resin, jalap resin and curd soap, and ¼ grain of ginger Dose.– 1 or 2 pills.

JALAPINUM
(Jalapin.)

Jalapin

Jalapin is the ether-insoluble portion of the resin obtained from jalap and may be prepared by precipitating an alcoholic solution of the purified resin with ether. It occurs as a white, odourless powder, and has an acrid and nauseating taste in alcoholic solution The alcoholic solution is neutral, and reduces ammoniacal silver nitrate solution on gentle heating. It also reduces Fehling's solution, after first heating with dilute mineral acid. Melting-point, about 155° It dissolves in alkalis with decomposition. Sulphuric acid produces a red colouration. Oxidation with nitric acid converts it into oxalic and sebacic acids. The ether-insoluble portions of the resins obtained from scammony root and ipomœa are said to be identical with jalapin. The name jalapin is also applied in Germany to the ether-soluble resin of ipomœa.

Soluble in alcohol, glacial acetic acid and ethyl acetate; slightly soluble in chloroform; insoluble in ether, light petroleum, benzene and water

Action and Uses.—Jalapin possesses properties similar to those of jalap resin, but is considered to be less active. It may be **administered** in cachets, or in pills prepared with syrup of liquid glucose and containing, preferably, soap and oleoresin of ginger or capsicum It is sometimes prescribed with calomel as a brisk purge and as an anthelmintic.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

JUNIPERUS
(Junip.)

Juniper

Synonyms—Juniperi Fructus; Juniper Berry.

Juniper consists of the ripe fruits of *Juniperus communis* Linn (Fam. Pinaceæ), an evergreen shrub or small tree growing chiefly on chalky downs in temperate Europe, Asia and North America.

The fruit is a subspherical galbulus, from about 0·5 to 1 centimetre in diameter, deep purplish-black, sometimes with a reddish tint, and covered with a greyish, waxy bloom. At the apex is a three-rayed furrow where the three fleshy scales meet, and at the tip of each scale is a brown, corky projection. At the base are one or more whorls each of three small bracts, the whorls alternating with one another. Internally, embedded in the fleshy scales, are three ovate seeds, each with a hard woody testa, to which a few large, ovoid oil-glands are attached. The odour is aromatic and the taste sweet, terebinthinate and bitterish.

Juniper **contains** volatile oil (about 0·5 to 2 per cent.), resin (about 10 per cent.), fermentable sugar (about 33 per cent.), a bitter substance, juniperin, and organic acids.

Action and Uses.—The action of juniper resembles that of oil of juniper. The drug is used as a constituent of compound powders, especially in veterinary practice.

KALADANA
(Kalad.)

Kaladana

Synonym—Pharbitis Seeds.

Kaladana consists of the dried seeds of *Ipomœa hederacea* Jacq. (Fam. Convolvulaceæ), a twining plant indigenous to India.

The seeds are about 5·5 millimetres long and about 3 7 millimetres wide, 100 weighing from 3 to 4 grammes. In shape they vary from approximately a sixth to a quarter segment of an oblate spheroid On the curved surface is a central, shallow, longitudinal groove. The two flat faces, which are about as wide as the curved surface, meet at an angle, usually between 60 and 85 degrees, forming a ridge, near the proximal end of which is a cordate, hilar depression, brownish in colour, due to a dense covering of short, brown hairs which do not project above the level of the general surface. The testa is dull black, hard, smooth and apparently glabrous; on magnification, short trichomes become visible as white dashes. The taste is at first sweetish but subsequently acrid. A longitudinal section shows two plaited cotyledons in which numerous resin cells are visible, a narrow, mucilaginous endosperm which lines the testa and penetrates between the larger folds of the cotyledons, and a crescent-shaped hypocotyl-radicle, the radicle end of which is bluntly pointed

The diagnostic **microscopical** characters are the tangentially elongated, wavy-walled cells of the epidermis, upon which are sparsely scattered trichomes varying in length from 60 to 200 microns and the pitted cells of the nutritive layer.

Kaladana **contains** about 12 per cent. of fixed oil and 16 per cent. of a resinous substance consisting of a true resin associated with glycosidal

matter and probably a small amount of a saponin. The true resin, which amounts to about 2 per cent. of the drug, is not glycosidal and is not identical with the ether-insoluble resin of jalap.

Substitutes.—Seeds of other species of *Ipomœa* frequently occur in the commercial drug The most important of these is the seed of *Ipomœa muricata* Jacq. which is brown and glabrous The seeds are about 8·5 millimetres long and about 6 millimetres wide, and there is no longitudinal groove on the arched dorsal surface; 100 weigh from 14 to 18 grammes Seeds of *Crotalaria juncea* Linn. and of *Acacia arabica* Willd occur as admixtures, and the seeds of *Peganum Harmala* Linn. and of *Ocimum Basilicum* Linn. are sometimes sold in India as kaladana

Action and Uses.—Kaladana is used as an equivalent of jalap in India and the Eastern Colonies. A compound powder (Pulvis Kaladanæ Compositus) and a tincture (Tinctura Kaladanæ) are prepared, and are of the same strength as, and used in a similar manner to, the corresponding preparations of jalap.

Dose.– 2 to 3 grammes (30 to 45 grains).

KALADANÆ RESINA.—Kaladana resin is used in India and the Eastern Colonies as a substitute for jalap resin, which it closely resembles in its action. **Dose.**– 0·12 to 0·5 gramme (2 to 8 grains).

KAMALA

(Kamal.)

Kamala

Synonym—Glandulæ Rottleræ.

Kamala consists of the hairs and glands separated from the fruits of *Mallotus philippinensis* Müll. Arg. (Fam. Euphorbiaceæ), a small tree widely distributed throughout India and the Malay Archipelago. The drug is obtained by rubbing the small three-celled fruits and sifting the resulting powder.

The drug forms a fine, mobile, dull reddish-brown powder of heterogeneous nature, which floats when sprinkled on water, the liquid remaining colourless. With chloroform, ether and solutions of caustic alkalis, a reddish-brown solution is obtained. It is odourless and tasteless. Examined **microscopically,** the glands are sub-globular, from 40 to 100 microns in diameter, and contain numerous club-shaped cells, radiately arranged, and embedded in a dark red, resinous mass, which is surrounded by a delicate cuticle. The hairs are thick-walled, unicellular, pointed, curved, and arranged in radiating groups of two to ten. A small amount of vegetable debris is unavoidably associated with the hairs and glands.

Kamala **contains** rottlerin, a substance which crystallises in thin, salmon-coloured plates; the drug also contains yellow and red resins, wax and a yellow, crystalline substance. So-called *iso*rottlerin appears to be impure rottlerin.

Substitutes and Adulterants.—Waras, Wurus, or True Wars, consists of the hairs and glands of the fruits of *Flemingia congesta* Roxb (Fam Leguminosæ) It is distinguished by the dull purplish colour, the cylindrical shape of the glands, the constituent cells, which are arranged in tiers, and the hairs, which occur singly Ground safflower and dried starch, if present, are readily distinguished microscopically. The presence of ferric oxide and ferruginous sand is detected by mixing with water when such particles sink· the ash is also considerably increased

Standard.—Kamala yields not more than 9 per cent. of ash.

Action and Uses.—Kamala is employed as an anthelmintic against tape-worm. It produces free purgation and is usually very efficacious, expelling the worm. The powder may be given mixed with honey, gruel or treacle, or made into a draught with mucilage of acacia and water. The dose should be preceded by doses of sodium bicarbonate three times a day for forty-eight hours No purge need be given after the powder.

Dose.– 2 to 8 grammes (½ to 2 drachms).

KAOLINUM

(Kaolin.

Kaolin

Synonym—China Clay

Kaolin is a native aluminium silicate, powdered and freed from gritty particles by elutriation. The native clay is derived from the decomposition of the felspar of granite rocks and contains approximately 47 per cent. of silica, 40 per cent. of alumina and 13 per cent. of water. It is found in large quantities in Cornwall. Varieties of kaolin consisting of finely divided particles are sometimes described as colloidal kaolin; they are produced by various processes, some of which involve electrical precipitation. Kaolin occurs as a soft, whitish powder, odourless when dry, but developing a clay-like odour when moistened. It has an earthy taste, is insoluble in all ordinary solvents and is unaffected by most chemical reagents. When fused with alkalis, silicates and aluminates of the alkali metals are formed. An impure variety of kaolin, containing iron and magnesium, is known as "fuller's earth"; a purer form is known as "white fuller's earth."

Insoluble in water and mineral acids.

Standard, B.P.—Kaolin loses, on ignition at a red heat, not more than 15 per cent. of its weight. Arsenic limit, 2 parts per million. Lead limit, 5 parts per million It complies also with limit tests for matter soluble in N/5 hydrochloric acid, and for chloride.

Action and Uses.—Kaolin has the property of adsorbing toxins from the alimentary canal, and its use for this purpose is indicated in the treatment of cholera, dysentery, colitis and similar infections. It is

usually **administered** as a suspension in water or liquid paraffin. It is sometimes used in place of bismuth carbonate to form a protective coating to the gastro-intestinal mucous membrane. Kaolin is employed for its absorbent properties in the preparation of pill masses, especially in the presence of substances, such as phosphorus, which are readily oxidised. In the form of Unguentum Kaolini, it is used to prepare pills of potassium permanganate, silver nitrate, and other substances which would be reduced by contact with the organic matter of ordinary pill excipients. Kaolin is used in place of fuller's earth in dusting and toilet powders; it is absorbent, and prevents irritation due to friction. It is also used in the preparation of Cataplasma Kaolini, which has largely replaced the domestic linseed and bread poultices. Kaolin is also used as a filtering medium to clarify syrups and cloudy solutions of volatile oils, and forms a silicate basis for many carbolic and similar disinfectant powders.

Dose.– 15 to 60 grammes (½ to 2 ounces).

Preparations

Cataplasma Kaolini, B.P.—(Cataplasm. Kaolin.)—Poultice of Kaolin. It contains approximately 53 per cent. w/w of kaolin, with boric acid, methyl salicylate, oil of peppermint, thymol and glycerin

This poultice was included in the British Pharmaceutical Codex, 1923.

Emulsio Paraffini Liquidi et Kaolini, B.P.C.—(Emuls. Paraff. Liq. et Kaolin.)—Emulsion of Liquid Paraffin and Kaolin. Each fluid ounce contains 2 fluid drachms of liquid paraffin and about 80 grains of kaolin. Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

Unguentum Kaolini, B.P.C.—(Ung. Kaolin.)—Kaolin Ointment. *Syn.*—Massa Kaolini; Kaolin Mass. Kaolin, 1 in 4, with hard and soft paraffins.

KAVA
(Kava)

Kava

Synonyms—Kavæ rhizoma; Kava-Kava.

Kava is the rhizome of *Piper methysticum* Forst. (Fam. Piperaceæ), a shrub indigenous to the Sandwich Islands. The roots and periderm are removed from the rhizome, which is cut into irregular pieces, and dried.

The rhizome occurs in irregularly cubical or wedge-shaped pieces from 1·5 to 5 centimetres in thickness, pale greyish-white to greyish-brown in colour and of a somewhat loose texture. The transversely cut surface is whitish and mealy, and shows a large, shrunken pith surrounded by narrow, radial strands of xylem, separated by paler and wider medullary rays and extending almost to the outer surface. The fracture is coarsely fibrous and starchy. The odour is slight and agreeable, and the taste is at first bitter and subsequently numbing.

In addition to resin and much starch, kava **contains** methysticin, kawain and yangonin. The substance known as pseudomethysticin is a mixture of methysticin and dihydromethysticin. The drug also contains dihydroyangonin and kawaic acid.

Substitutes.—The unpeeled drug, covered with a dark grey cork, is frequently found in commerce. Smaller pieces, with numerous stout roots attached, are frequently present

Action and Uses.—Kava resembles pepper in its local action and is employed medicinally as an antiseptic, and diuretic in inflammatory conditions of the genito-urinary tract. It is **administered** in the form of liquid extract.

Preparation

Extractum Kavæ Liquidum, B.P.C.—(Ext. Kavæ Liq.)—Liquid Extract of Kava. 1 in 1. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This liquid extract was included in the British Pharmacopœia, 1914.

KERATINUM
(Keratin.)

Keratin

Keratin is a name applied to a group of proteins which form the chief constituents of horns, hoofs, feathers, hair, wool, etc., and which have in common the property of being very resistant to enzyme action and chemical reagents. They are characterised by a high proportion of sulphur in their composition, due to the large amount of cystine present. Keratins are insoluble in water and dilute acids or alkalis. They are slowly hydrolysed by boiling concentrated acids, and fairly readily hydrolysed by strong alkalis in the cold. Keratins are remarkable for the rapidity with which they are attacked by the sulphides of the alkali metals and the alkaline earth. They are not attacked by pepsin, trypsin, or bacterial tryptases. Keratin may be obtained by macerating horn shavings or goose quills for several days in a mixture of equal parts of ether and alcohol, decanting the liquid and washing the residue with warm water. The washed shavings are then treated for several hours with an acidified solution of pepsin at 40°. After further washing with distilled water, the residue is dried and powdered. It may be further purified by boiling with glacial acetic acid for about thirty hours in a flask with a reflux condenser, filtering the solution thus obtained through glass-wool and evaporating it to a thick syrupy consistence, after which it may be spread on glass plates, dried between 60° and 70°, and scaled.

Keratin occurs as a brownish-yellow powder, or in transparent, white or greyish-white scales, without taste or odour. It may be softened by prolonged boiling in water, and is decomposed by boiling under pressure, a turbid solution being formed and hydrogen sulphide liberated. On

ignition, it leaves about 1 per cent. of ash. After digesting for twenty-four hours with fifteen times its weight of dilute solution of ammonia or glacial acetic acid, at about 40°, keratin leaves about 3 per cent. of insoluble residue.

Insoluble in water, alcohol and ether.

Action and Uses.—Keratin is used in pharmacy mainly for the purpose of coating pills, tablets and capsules that are required to pass through the stomach unchanged, in order that the contents may exert their action only in the intestines, but its efficiency for this purpose is doubtful.

Preparation

Liquor Keratini, B.P.C.—(Liq. Keratin.)—Solution of Keratin. Keratin, about 10 per cent. w/v, with strong solution of ammonia and alcohol (90 per cent.).

KINO
(Kino)
Kino

Synonyms—East Indian, Malabar, Madras, or Cochin Kino.

Kino consists of the dried juice obtained from the trunk of *Pterocarpus Marsupium* Roxb. (Fam. Leguminosæ), a tree growing in Southern India and Ceylon. The juice is contained in longitudinal rows of superposed cells, 50 to 100 microns wide, in the phloem. Vertical incisions, with oblique lateral ones running into them, are made in the bark of the tree; the thick, reddish juice that exudes is collected and dried, and yields about half its weight of kino, which readily breaks into small fragments. The juice should be boiled before drying so as to destroy the enzymes and prevent them from bringing about changes which readily occur in the unboiled juice on exposure to air.

Kino occurs in small (about 3 to 5 millimetres), angular, glistening, brittle fragments which appear to be almost black in colour, but the edges when viewed by transmitted light, are seen to be ruby-red and transparent. The fragments break with a glassy fracture and yield a brownish-red powder, but the drug is, however, very free from dust. It is odourless and has a sweetish and astringent taste; on being chewed it adheres to the teeth and colours the saliva red. Kino is partly **soluble** (about 60 to 70 per cent.) in cold water, but more soluble (about 90 per cent.) in boiling water; the solution is slightly acid and gives a dark green precipitate with ferric chloride solution and a reddish-violet colour with solutions of alkalis. It yields to alcohol (90 per cent.) about 75 per cent. of extractive. On the addition of 2 millilitres of N/10 iodine to 5 millilitres of a filtered 1 per cent. solution of kino in cold water, a slight precipitate is produced which dissolves on adding 0·5 millilitre of dilute ammonia solution (distinction from butea kino); if the liquid is

boiled for one minute and cooled before adding the dilute ammonia solution, the precipitate is insoluble (distinction from eucalyptus kino).

Kino **contains** kinotannic acid (70 to 80 per cent.). It also contains kino red, a phlobaphene produced from kinotannic acid by oxidation, and small quantities of pyrocatechin (catechol), protocatechuic acid, gallic acid, and gum. The presence of an oxydase causes oxidation of the kinotannic acid to proceed slowly in the drug, which gradually becomes duller in appearance; oxidation also takes place in aqueous and alcoholic solution, the phlobaphene produced causing the liquid to gelatinise. Since the activity of the enzyme is destroyed by heat, a tincture of kino which has been boiled will not undergo gelatinisation. The proportion of kinotannic acid present in the drug has been variously stated, but appears, in good fresh samples assayed by the hide powder process, to range from 70 to 82 per cent. Kino contains about 15 per cent. of moisture.

Substitutes.—African kino, from *Pterocarpus erinaceus* Lam., eucalyptus kino, from *Eucalyptus rostrata* Schlecht. and other species of *Eucalyptus*, and butea kino, from *Butea frondosa* Roxb., occur in commerce.

Standard.—Kino yields to boiling water, not less than 75 per cent. of extractive. Ash, not more than 2·5 per cent.

Kino, in powder (Pulvis Kino: Pulv. Kino), contains the constituents of, and complies with the standard for, the unground drug.

Action and Uses.—Kino is a powerful astringent used either externally or internally. It has the general properties of substances containing a large proportion of tannic acid (see Acidum Tannicum), and has the advantage over the pure substance of not being so readily absorbed, and of exerting its astringent action in the intestine without upsetting the stomach, since the tannin is liberated only slowly in the alimentary canal. For inflamed throat, kino lozenges are employed. The tincture is added to gargles (1 to 16), and, mixed with tincture of myrrh and diluted with water, it is used as an astringent wash for spongy gums. Internally, kino is **administered** as Pulvis Kino Compositus in obstinate diarrhœa and dysentery, the powder being given enclosed in a cachet or a glutoid capsule. The tincture may be prescribed with bismuth salts or chalk mixture in the treatment of diarrhœa.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

Preparations

Pulvis Kino Compositus, B.P.C.—(Pulv. Kino. Co.)—Compound Powder of Kino. Kino, 75 per cent., powdered opium, 5 per cent., and cinnamon, 20 per cent. Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

This powder was included in the British Pharmacopœia, 1914.

Tinctura Kino, B.P.C.—(Tinct. Kino)—Tincture of Kino 1 in 10. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

KINO EUCALYPTI

(Kino Eucalyp.)

Eucalyptus Kino

Synonyms—Gummi Eucalypti; Red Gum.

Eucalyptus kino consists of the dried juice obtained from *Eucalyptus rostrata* Schlecht., and other species of *Eucalyptus* such as *E. marginata* Smith and *E. amygdalina* Labill. (Fam. Myrtaceæ), indigenous to New South Wales, Australia, and found especially along the banks of the Murray River. The secretion-cavities occurring in the wood, or sometimes in the cambial zone, are tapped by making incisions, under each of which a V-shaped strip of metal is fixed, by which means the exuding liquid is drained into containers; the viscous fluid is evaporated by boiling, and on drying it becomes solid and friable.

Eucalyptus kino occurs in irregular fragments (about 5 to 10 millimetres) of a dark reddish-brown colour, opaque and more or less dusty; thin flakes are somewhat transparent and ruby-red by transmitted light; it yields a reddish-brown powder having an astringent taste, and adhering to the teeth, colouring the saliva red. The solution in water is neutral to litmus. On the addition of 2 millilitres of N/10 iodine to 5 millilitres of a filtered 1 per cent. solution of eucalyptus kino in cold water, a precipitate is produced which dissolves on adding 0·5 millilitre of dilute ammonia solution (distinction from butea kino); if the liquid is boiled for one minute and cooled before adding the dilute ammonia solution, the precipitate is soluble (distinction from kino).

The composition of eucalyptus kino appears to vary considerably, according to the species from which it is obtained. It **contains** kino-tannic acid which gives a green colouration with ferric chloride. Other constituents which may be present are a tannin glycoside, an insoluble phlobaphene (kino red), catechin, pyrocatechin (catechol), resin, and crystallisable bodies named eudesmin and aromadendrin. Eucalyptus kino contains about 15 per cent. of moisture. It yields to alcohol (90 per cent.) about 90 per cent. of extractive, and to cold water about 80 per cent. of extractive.

Standard.—Eucalyptus kino yields to alcohol (90 per cent.) not less than 80 per cent. of extractive. Ash, not more than 3 per cent.

Eucalyptus kino, in powder (Pulvis Kino Eucalypti : Pulv. Kino Eucalyp.), contains the constituents of, and complies with the standard for, the unground drug.

Action and Uses.—Eucalyptus kino is a valuable astringent for the throat. Its action is similar to that of kino, but weaker and more prolonged. It is **administered** in the form of lozenges and pastilles. Extractum Kino Eucalypti Liquidum is a styptic; diluted with 15 parts of water, it is used as an astringent gargle. The tincture is used similarly. The powdered drug, the tincture, and the liquid extract are

used internally as astringents in the treatment of diarrhœa and dysentery.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

Preparations

Extractum Kino Eucalypti Liquidum, B.P.C.—(Ext. Kino Eucalyp. Liq.)—Liquid Extract of Eucalyptus Kino. *Syn.*—Extractum Gummi Rubri Liquidum; Liquid Extract of Red Gum. 1 in 4. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tinctura Kino Eucalypti, B.P.C.—(Tinct Kino Eucalyp.)—Tincture of Eucalyptus Kino *Syn.*—Tinctura Gummi Rubri, Tincture of Red Gum. 1 in 4 Dose.– 1 to 2·6 millilitres (15 to 40 minims).

Trochisci Kino Eucalypti, B.P.C.—(Troch. Kino Eucalyp.)—Eucalyptus Kino Lozenges. *Syn.*—Red Gum Lozenges; Eucalyptus Gum Lozenges. Each lozenge contains 1 grain of eucalyptus kino.

This lozenge, containing 0·06 gramme of eucalyptus kino, was included in the British Pharmacopœia, 1914.

KOLA
(Kola)
Kola

Synonyms—Kola Nuts; Cola Seeds.

Kola consists of the dried cotyledons of *Cola vera* K. Schum. (Fam. Sterculiaceæ), a large tree growing wild in Sierra Leone, North Ashanti, and near the sources of the Niger, and cultivated in West Africa, the West Indies, Brazil and Java.

The cotyledons vary from 2 to 5 centimetres in length and are rather less in breadth. The shape is roughly plano-convex but varies considerably. Externally, the cotyledons are reddish-brown in colour, hard and solid, and break with a uniform fracture, the fractured surface being somewhat lighter in colour. There is no marked odour, but the taste is slightly bitter and astringent.

Kola **contains** caffeine (about 1·5 per cent.), traces of theobromine, kola red, fat, an oxydase, sugar and starch. The ash averages about 2 per cent.

Substitutes.—The seeds of *Cola acuminata* Schott and Endl., a tree growing in the Cameroons, having 3 to 5 cotyledons, are sometimes on the market; they contain less caffeine Seeds with 6 cotyledons are also met with; these are derived from *Cola Ballayi* Cornu, and contain but little caffeine

Action and Uses.—The properties of kola are virtually those of caffeine, modified slightly by the astringent matter present The powdered drug is prepared in the form of chocolate and cocoa for its stimulating and sustaining properties. The liquid extract is sometimes used with liquid extract of coca, as a stimulant, or with phenazone, for use in migraine, mucilage being added to suspend resinous matters.

Dose.– 1 to 3 grammes (15 to 45 grains).

Preparations

Extractum Kolæ Liquidum, B.P.C.—(Ext Kolæ Liq.)—Liquid Extract of Kola 1 in 1 Dose.– 0·6 to 1·2 millilitres (10 to 20 minims)

Tinctura Kolæ, B.P.C.—(Tinct Kolæ)—Tincture of Kola. 1 in 5. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm)

KRAMERIA
(Kramer.)

Krameria

Synonyms—Krameriæ Radix; Krameria Root; Rhatany Root.

Krameria consists of the dried root of *Krameria triandra* Ruiz et Pav (Fam. Leguminosæ), a shrubby plant indigenous to the mountain slopes of Peru and Bolivia. It is known in commerce as Peruvian rhatany

The drug consists of a knotty crown, about 3 to 5 centimetres wide, to which are attached a number of nearly straight, but somewhat tortuous, roots which are dark reddish-brown and have a scurfy or, in the older pieces, a rugged and scaly bark; the smaller and smoother pieces show no conspicuous transverse fissures; the fracture is fibrous in the bark and splintery in the wood The smoothed, transversely cut surface shows a dark reddish-brown bark, extending up to about one-third of the radius in thickness, and a dense, pale reddish-brown and finely porous wood which is traversed by numerous fine medullary rays and often shows a central, darker heartwood. The drug is odourless, but the bark has an astringent taste; the wood is almost tasteless.

The diagnostic **microscopical** characters are the thin-walled cork cells containing a dark reddish-brown colouring matter; the small groups of long, unlignified, phloem fibres, accompanied by files of parenchyma containing prisms or sandy crystals of calcium oxalate; the numerous simple and compound starch grains, up to 40 microns in diameter, from the general parenchyma; the large amount of strongly thickened fibres and the vessels from the xylem

Krameria **contains** about 8·5 per cent. of krameriatannic acid The root also contains a dark red phlobaphene (krameria red), produced by the decomposition of the tannin, together with starch, etc It yields to alcohol (60 per cent.), from 30 to 40 per cent. of extractive

Substitute.—The root of *K. argentea* Mart. is exported from Brazil and is known in commerce as Pará rhatany. It may be distinguished by the appearance of the outer surface, which is of a deep purplish-brown colour longitudinally wrinkled, and bears deep transverse fissures at intervals of about 6 to 12 millimetres, but is not rough or scaly It is rarely over 12 millimetres in thickness and the width of the bark, as seen in section, is equal to about half the radius The alcohol-soluble extractive is less than that of krameria and the tincture gives a clear solution when diluted with water

Standard, B.P.—Krameria contains not more than 2 per cent of foreign organic matter Ash, not more than 6 per cent

Krameria, in powder (Pulvis Krameriæ · Pulv Kramer), contains

the constituents and possesses the diagnostic microscopical characters of Krameria, and complies with the limit for ash of the unground drug.

Action and Uses.—Krameria is a powerful astringent, used both externally and internally, and has the general properties of tannic acid. It is used with or without cocaine, in the form of a lozenge or pastille, for sore throats. Extractum Krameriæ Siccum is given in pills as an intestinal astringent; it may also be used in the form of a suppository, with opium if necessary, for bleeding or prolapsed hæmorrhoids. The powdered root is added to tooth powders for use when the gums are spongy and inflamed. Tinctura Krameriæ, diluted with 12 parts of water, is used as a gargle for inflamed throats, and as a mouth-wash in stomatitis. Preparations of krameria are **incompatible** with gelatin and salts of iron.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

Preparations

Extractum Krameriæ Siccum, B.P.—(Ext. Kramer. Sicc.)—Dry Extract of Krameria. It is prepared with water and evaporated to dryness under reduced pressure. It should be stored in small, wide-mouthed well-closed containers in a cool place. Dose.– 0·3 to 1 gramme (5 to 15 grains).

Infusum Krameriæ Concentratum, B.P.C.—(Inf. Kramer. Conc.)—Concentrated Infusion of Krameria 1 in 2½. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of krameria and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Infusum Krameriæ Recens, B.P.C.—(Inf. Kramer. Rec.)—Fresh Infusion of Krameria. *Syn.*—Infusion of Rhatany. 1 in 20. When infusion of krameria or Infusum Krameriæ is prescribed, fresh infusion not being specified, either Infusum Krameriæ Recens, or Infusum Krameriæ Concentratum suitably diluted, may be dispensed.

This infusion was included in the British Pharmacopœia, 1914, under the name of Infusum Krameriæ.

Tinctura Krameriæ, B.P.—(Tinct. Kramer.)—Tincture of Krameria. 1 in 5, by percolation with alcohol (60 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Trochiscus Krameriæ, B.P.—(Troch. Kramer.)—Lozenge of Krameria. *Syn.*—Krameria Lozenge. Each lozenge contains approximately 0·06 gramme or 1 grain of dry extract of krameria.

Trochiscus Krameriæ et Cocainæ B.P.—(Troch. Kramer. et Cocain.)—Lozenge of Krameria and Cocaine. *Syn.*—Krameria and Cocaine Lozenge. Each lozenge contains approximately 0·06 gramme or 1 grain of dry extract of krameria and approximately 0·003 gramme or $\frac{1}{20}$ grain of cocaine hydrochloride.

LAC COACTUM

(Lac Coact.)

Curdled Milk

Synonym—Soured Milk.

Curdled milk is prepared by sterilising cows' milk by heating it in

an autoclave at a temperature of 125° for thirty minutes and cooling to 40°; a culture of *Bacillus bulgaricus* or *B acidophilus* is then added and the temperature maintained at 38° to 40° for eight to twelve hours, according to the concentration and activity of the culture employed The organisms may be added as liquid cultures or in lightly compressed tablets. They should be freshly prepared. The tablets contain the bacilli in a more or less dormant condition, and require a longer incubation with milk to produce curdled milk.

Action and Uses.—Curdled milk is employed as an intestinal antiseptic to inhibit the growth of putrefactive micro-organisms Its action is due to the massive ingestion of the lactic acid-producing bacilli, many of which pass through the stomach into the intestinal tract where they produce a *p*H unsuited to the growth of many forms of putrefactive bacteria. The flora of the tract is changed and the reaction altered to suit the growth of the benign micro-organisms.

LACTIC ACID MILK consists of cows' milk to which has been added one drachm of lactic acid, drop by drop, to each pint. It should be freshly prepared (see Acidum Lacticum) Dried lactic acid milks, which when reconstituted by the addition of water represent whole milk, half-cream milk, and separated milk, are in common use. Lactic acid milk is used in infant feeding and in cases of gastro-enteritis associated with diminished secretion

HYDROCHLORIC ACID MILK is made by adding 40 minims of dilute hydrochloric acid to a pint of fresh milk. It is used in cases of lactalbumin sensitiveness, especially associated with a deficiency of gastric secretion. It finds its greatest use in cases of eczema and asthma in childhood.

LACCA
(Lac.)
Shellac

Shellac consists of a resinous substance prepared from a secretion that encrusts the bodies of a scale insect, *Tachardia lacca* R. Blanchard (Order Hemiptera, Fam. Coccideæ), which lives on the juices of the stems of various plants; the best known of these are *Butea frondosa* Roxb., *Ficus religiosa* Linn., *Schleichera trijuga* Willd., *Shorea robusta* Gaertn. and *Zizyphus Jujuba* Lam., but there are also plants specially grown for the purpose, including *Acacia arabica* Willd. and *Cajanus indicus* Spreng. Most of the shellac of commerce comes from Mirzapore and Calcutta. The encrusted twigs, collected from the trees during May, June, October and November, are known as "stick lac." The resinous crust is broken from the twigs, washed with water to remove the red colouring matter, known as "lac dye," and dried, thus forming "seed lac." The washed and dried seed lac is melted with a certain proportion of orpiment and resin in bags of special cloth.

through which it is pressed. This molten lac is placed on a surface heated by means of hot water, and spread into a sheet or skin about 3 millimetres in thickness. This is further stretched out, and so made to yield a very thin, paper-like, sheet shellac. It is then sorted according to colour.

Shellac occurs in thin fragments or scales, varying in size, and often somewhat curved, reddish-orange to reddish-brown in colour, transparent, hard and brittle, odourless and tasteless. The palest variety is the most esteemed, and is known as "orange" shellac. The darker varieties, known as "ruby," "garnet," etc., diminish in value in proportion to the depth of colour. Shellac is insoluble in water, but easily soluble in alcohol, especially on heating; it is soluble also in solutions of potassium and sodium hydroxides, and borax. Cold light petroleum, free from water and alcohol, extracts only about 5 per cent., consisting chiefly of wax. Digested with ammonia in a closed vessel, shellac swells to a gelatinous mass. The iodine value at 22° is between 10 and 20.

Shellac **contains** about 6 per cent. of wax, about 6·5 per cent. of a pigment named laccin or laccaic acid, 70 to 85 per cent. of resinous matter, 65 per cent. of which is insoluble in ether and 35 per cent. soluble in ether containing alcohol. The part insoluble in ether is probably a resinotannol ester of aleuritic acid, while the ether-soluble portion includes a yellow colouring matter called erythrolaccin.

Varieties.—"Button lac" and "garnet lac" are made from "seed lac," which is melted and then cooled by throwing it on to water.

Substitutes.—Colophony is added to lower the melting-point, an essential condition for many industries, and it is frequently present to the extent of from 2 to 5 per cent., few shellacs being entirely free from it. Colophony is detected by dissolving the sample in alcohol, pouring the solution into water, collecting and drying the precipitate, triturating it with light petroleum, filtering the liquid, and shaking the filtrate with a small quantity of water containing 0·1 per cent. of copper acetate; when colophony is present the light petroleum layer will show an emerald-green colour. The iodine value is also raised, colophony having a fairly constant iodine value of about 228 at 22°. "Bleached shellac" is prepared by treating an alkaline solution with chlorine or sulphurous acid, when, on the addition of sulphuric acid, it is obtained as a precipitate, which is collected, washed, "pulled" under water, and finally twisted into sticks and thrown into cold water. It has a yellowish-white colour and a silky lustre. It is readily soluble in alcohol or wood naphtha when freshly prepared, or when preserved under water, but becomes insoluble on exposure to the air or even on long keeping under water. "Liquid shellac" is formed by boiling shellac with solution of sodium hydroxide; on cooling, sulphuric acid is added, and the precipitated, viscous, liquid shellac can then be extracted with ether. It is a thick liquid, insoluble in water, but soluble in alcohol and ether. It forms salts with lead, zinc, barium and magnesium; the magnesium salt is amorphous, very soluble in water, precipitated on boiling, but redissolved on cooling.

Uses.—Shellac is of importance in the arts but is not used in medicine. It is the chief constituent of sealing wax, and is an ingredient of many varnishes and polishes. An ammoniacal solution is sometimes used as an enteric coating for pills and capsules.

LACTOSUM

(Lactos.)

Lactose

$C_{12}H_{22}O_{11},H_2O = 360{\cdot}2$

Synonyms—Saccharum Lactis; Milk Sugar.

Lactose, or α-lactose, is a crystalline disaccharide which may be obtained from the whey of milk by gently evaporating to a low bulk and setting aside for a few days, when the sugar crystallises out as a yellow, granular mass, and is subsequently decolourised with charcoal and recrystallised. Lactose occurs as an odourless, white, crystalline powder, with a slightly sweet taste The aqueous solution is dextrorotatory and reduces Fehling's solution when heated. Dilute acids convert it into galactose and dextrose; heated with alkalis it becomes brown. When heated to 130°, it loses its water of crystallisation without melting and leaves a white, hygroscopic mass; at higher temperatures, it melts, swells up and burns, evolving an odour of burnt sugar and leaving a bulky, carbonaceous residue. β-Lactose is also obtainable; it is anhydrous, more soluble than lactose, and passes to the α form in solution.

Soluble in water (1 in 7), boiling water (1 in 1); almost insoluble in alcohol (90 per cent.), ether and chloroform.

Standard, B.P.—Lactose has a specific rotation at 20°, determined on a 10 per cent. w/v boiled solution, of not less than +52° and not more than +52·6° Ash, not more than 0·1 per cent. Arsenic limit, 1 part per million. Lead limit, 2 parts per million. It complies also with limit tests for more soluble sugars, copper and acidity.

Action and Uses.—Lactose is a valuable nutrient. It is less sweet than sucrose and is less liable to cause intestinal fermentation. It is largely employed in the humanisation of cows' milk for infants. Lactose for general use is the most satisfactory form of sugar for infant feeding, but should not be used in excessive quantities since it is too laxative and renders the stools too acid. Mixtures of carbohydrates obtained by the partial hydrolysis of starch are also used. Cows' milk contains about 4·5 per cent. of lactose, whilst normal human milk approximates to 6·5 per cent When cows' milk is diluted with water to reduce the casein content, lactose is added to bring up the strength to 6·5 per cent. of the whole Lactose may sometimes appear in the urine of infants having diarrhœa, since any lactose which enters the blood is immediately excreted, the renal threshold for this sugar being practically zero. Demonstrable quantities of lactose are excreted in the urine, during the first five days after parturition, by about 40 per cent. of women; the amount may be as much as 2 per cent.

Lactose is slightly laxative and diuretic. It has been used in doses of 8 to 16 grammes (2 to 4 drachms) daily as a diuretic in renal dropsy Large doses of lactose are given with living cultures of *Bacillus acidophilus* when it is desired to favour the growth of this organism in the

intestine in the treatment of intestinal intoxication. It is employed in pharmacy as a diluent for standardised vegetable products and for powders It is used as an absorbent in the preparation of some extracts, but though less prone to absorb moisture than sucrose, it is not so suitable for this purpose as an inert vegetable powder

LACTUCA

(Lactuc.)

Lettuce

Synonym—Wild Lettuce.

Lettuce is the fresh, flowering herb, *Lactuca virosa* Linn. (Fam. Compositæ), a biennial plant indigenous to Europe and Northern Asia and cultivated in Britain and most European countries.

The plant has an erect, solid stem from 60 to 120 centimetres high, prickly near the base, smooth and branching above, and producing more or less leafy panicles of small, pale yellow flowerheads. The lower leaves are large, sessile, oblong-ovate, coarsely toothed and usually bear stiff bristles or prickles on the under surface of the midrib and lateral veins. The upper leaves are smaller, amplexicaul and more or less deeply lobed The florets number six to twelve and are all ligulate; the fruit is small and flattened and bears a slender beak about as long as the fruit. From the leaves and stem when incised, there exudes a copious, white, bitter latex, having a characteristic odour somewhat similar to that of opium.

Lettuce **contains,** in addition to the constituents of the latex, traces of a mydriatic alkaloid.

Action and Uses.—Lettuce is a mild sedative and hypnotic, and is used in the treatment of irritable cough. Extractum Lactucæ is prescribed in pill form, sometimes with calomel, and is an ingredient of lozenges and pastilles.

LACTUCARIUM.—Lettuce opium is the dried latex of lettuce. It occurs in hard, opaque, irregular pieces, often curved on one side. They are light green when fresh but become dull brown on keeping. The interior of fresh pieces may be whitish and soft, but darkens and hardens on keeping Lactucarium yields nearly half its weight to water, forming a deep brown infusion. The odour is characteristic, recalling that of opium, and the taste is bitter. Lactucarium contains a colourless, tasteless, crystalline substance named lactucerin, or lactucone (about 50 per cent.); this is accompanied by the bitter principles, lactucin and lactucic acid, which are crystalline, and lactucopicrin, which is amorphous Mannitol, sugar and caoutchouc are also present. Lactucarium is employed as a sedative for irritable cough, usually in pastilles and lozenges. Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Extractum Lactucæ, B.P.C.—(Ext. Lactuc.)—Extract of Lettuce. A soft extract prepared from the expressed juice Dose.– 0·3 to 1 gramme (5 to 15 grains).

LÆVULOSUM

(Lævulos.)

Lævulose

$C_6H_{12}O_6 = 180{\cdot}1$

Synonyms—Fructose; Levulose.

Lævulose consists mainly of the monosaccharide, lævulose, together with small quantities of dextrose and water. It is found frequently in nature, accompanying dextrose in fruits and honey, or cane sugar in other plants. Lævulose may be prepared from "invert sugar," which is a mixture of equal parts of dextrose and lævulose prepared by the hydrolysis of sucrose with dilute sulphuric acid. Excess of acid is removed by treatment with barium carbonate and the evaporated liquid is cooled in ice and treated with calcium hydroxide which combines with the lævulose to form a sparingly soluble saccharate. The precipitate is removed and decomposed by carbon dioxide, the precipitated calcium carbonate filtered off and the filtrate allowed to crystallise or evaporated to dryness *in vacuo*. Lævulose may also be obtained from the inulin of dahlia tubers and chicory root by boiling with dilute mineral acids.

It occurs as an odourless, white or cream coloured, hygroscopic, crystalline powder with a sweet taste. The aqueous solution is lævorotatory and reduces Fehling's solution; the specific rotation of pure lævulose at 20°, in a well-boiled 10 per cent. solution, is −93·6°. When heated it becomes anhydrous, and melts at about 95°; at 170° it is converted into the dextrorotatory compound, lævulosan, $C_6H_{10}O_5$, and at higher temperatures it swells up and burns, evolving an odour of burnt sugar and leaving a bulky, carbonaceous residue.

Very **soluble** in water and diluted alcohol; less soluble in alcohol (90 per cent.); insoluble in dehydrated alcohol and ether.

Standard, B.P.—Lævulose has a specific rotation, determined at 20° in a well-boiled 10 per cent. w/v aqueous solution and calculated on the substance dried at 105°, of not less than −81°. Loss on drying at 105°, not more than 5 per cent. Arsenic limit, 2 parts per million. Lead limit, 2 parts per million. Sulphated ash, not more than 2·5 per cent.

Action and Uses.—Lævulose is more easily assimilated than sucrose and has been recommended for use in such wasting diseases as phthisis, large quantities, 120 to 240 grammes (4 to 8 ounces), being given daily with tincture of quassia or other bitter. Lævulose, like other lævorotatory carbohydrates, is sometimes found to be assimilated by diabetics, when the usual carbohydrate foods increase the excretion of sugar in the urine and are therefore inadmissible. It is also recommended for administration to tuberculous children in place of lactose or sucrose. Lævulose is often used as a test of liver efficiency. Unless there is a definite lesion of the liver, lævulose does not raise the blood sugar concentration. 50 grammes in 100 millilitres of water is given by the

mouth and the blood sugar is determined at intervals of thirty minutes for two hours and compared with a sample taken before the ingestion of the lævulose.

LAPPA
(Lappa)
Burdock

Synonym—Burdock Root.

Burdock is the dried root of *Arctium majus* Bernh. (Fam. Compositæ) and of other species of *Arctium*, plants growing in Europe, Northern Asia and the United States of America. The roots are collected in the spring of the second year of their growth, before the flowers have appeared.

The root is simple, greyish-brown and usually occurs in pieces from 5 to 20 centimetres long and from 0·5 to 2 centimetres thick; it is sometimes split longitudinally, when the pieces assume a channelled form, frequently showing internally a whitish, lacunous tissue. Externally, the root is longitudinally wrinkled and bears the scars or small warty projections left by the removal of the small secondary roots; near the crown an indistinct annulation is sometimes seen and at the summit the felted-hairy remains of the leaf-bases may be present. The fracture is short and horny, the smoothed, transverse surface showing a light brown bark extending for about one quarter of the radius, then a dark cambium line surrounding a compact and indistinctly radiate xylem, which passes, towards the central quarter of the radius, into a white, parenchymatous region which has become lacunous by shrinkage. The odour is slight and the taste sweetish and mucilaginous.

Burdock **contains** inulin, fixed and volatile oils, pectin and sugar.

Standard.—Burdock contains not more than 5 per cent. of leaf-bases and stem and not more than 2 per cent. of other foreign organic matter.

Action and Uses.—Burdock is rarely used in medicine. It has been administered in the form of decoction (Decoctum Lappæ, 1 in 20) as a diuretic and diaphoretic, as much as a pint being given daily.

Dose.– 1 to 6 grammes (¼ to 1½ drachms).

LARIX
(Larix)
Larch

Synonyms—Laricis Cortex; Larch Bark.

Larch is the bark obtained from *Larix europæa* DC. (Fam.

Pinaceæ), a tree indigenous to Southern and Central Europe and cultivated in Britain. The bark is stripped from the branches and dried. Young bark, or older bark deprived of its outer portion, is preferred.

The bark occurs in flat, curved or channelled pieces, rarely in quills. The outer bark, when not removed, is frequently largely developed, its outer surface is yellowish or dark brown and fissured, and it readily splits tangentially into flakes, disclosing a rose-coloured surface; the inner bark is narrow and whitish. The fracture is short and somewhat fibrous. The smoothed, transverse section shows a rhytidome built up of laminæ of reddish-brown cork separated by tangential plates of rose-pink tissue. The odour is terebinthinate and the taste is astringent, terebinthinate and rather bitter.

The diagnostic **microscopical** characters are the large, spindle-shaped and often irregular bast fibres, which may be as much as a millimetre in length, and certain long, narrow cells of the phloem parenchyma, each containing several small, prismatic crystals of calcium oxalate.

Larch **contains** tannin, and the crystalline bitter principle, larixin (larixinic acid), which appears to be allied to catechol. Larixin is said to be most abundant in the young bark.

Action and Uses.—Larch has been used internally as an expectorant in chronic bronchitis in the form of a tincture (Tinctura Laricis, 1 in 8; dose, 20 to 30 minims).

LAUROCERASUS

(Laurocer.)

Cherry-laurel

Synonyms—Laurocerasi Folia; Cherry-laurel Leaves.

Cherry-laurel consists of the fresh leaves of *Prunus Laurocerasus* Linn. (Fam. Rosaceæ), an evergreen shrub indigenous to Persia and Asiatic Turkey and cultivated in temperate regions.

The leaves are shortly petiolate, with a simple, coriaceous lamina, from 12 to 17 centimetres long and from 4 to 5 centimetres broad, oblong-lanceolate to oblong-obovate, the apex being acuminate and recurved. The margin is distantly serrate and slightly revolute; the upper surface is dark green and glossy, the lower surface paler. The midrib is prominent below and the venation is pinnate, the lateral veins anastomosing near the margin. One or two nectaries occur on the under surface at the base of the lamina on either side of the midrib. The leaves, when bruised, develop the characteristic odour of prussic acid and benzaldehyde.

Cherry-laurel **contains** the glycoside, prulaurasin (laurocerasin), which has been obtained in long, slender, acicular, bitter crystals, melting at 120° to 122°; it closely resembles amygdalin, but is not identical with it, prulaurasin being the glycoside of racemic mandelonitrile,

whereas amygdalin is the gentiobioside of *a*-mandelonitrile. It contains also the enzyme, prunase, which in contact with the prulaurasin decomposes it with formation of dextrose, hydrocyanic acid and benzaldehyde. The leaves yield, on an average about 0·1 per cent of hydrocyanic acid; young leaves yield more than old ones and unexpanded leaves may yield as much as 2·4 per cent

Action and Uses.—Cherry-laurel is used for the preparation of Aqua Laurocerasi, which is employed for internal and external use as a sedative, in place of dilute hydrocyanic acid It is added to eye lotions (1 in 16), and is also prescribed as a flavouring agent.

Preparation

Aqua Laurocerasi, B.P.C.—(Aq. Laurocer.)—Cherry-laurel Water. *Syn.*—Aqua laurocerasi I.A. It is prepared by distillation from the fresh leaves, the product being adjusted to contain from 0·09 per cent to 0·11 per cent w/v of HCN. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms)

This water was included in the British Pharmacopœia, 1914

Aqua amygdalæ amaræ I.A is prepared from bitter almond and contains 0·1 per cent. of hydrocyanic acid.

LAWSONIA

(Lawson.)

Henna

Synonym—Henna Leaf.

Henna consists of the dried leaves of *Lawsonia alba* Lam. (Fam. Lythraceæ), a shrub indigenous to Arabia and cultivated in Northern Africa, India and Ceylon.

The leaves are about 2·5 to 5 centimetres long and 1 to 2·5 centimetres broad, oval, greenish-brown or brown, and glabrous, having a short petiole, mucronate apex, entire and revolute margin, decurrent base, and pinnate venation, the lateral veins being curved and joining near the margin.

The diagnostic **microscopical** characters are the polygonal, tabular cells of the epidermis with striated cuticle; the cells of the mesophyll containing yellow colouring matter; the cluster-crystals of calcium oxalate measuring up to about 40 microns in diameter; 2 or sometimes 3 rows of palisade on each side; the absence of trichomes.

Henna **contains** fats, an ether-soluble resin, hennotannic acid and a colouring matter, lawson (2-hydroxy-1 : 4-naphthoquinone). It yields to water about 25 to 33 per cent. of extractive. The ash is from 7 to 10·5 per cent.

Standard.—Henna yields to water not less than 25 per cent. of extractive. Acid-insoluble ash, not more than 4 per cent Boil 2

grammes for thirty minutes with 40 millilitres of water; in the decoction, boil for one hour 0·5 gramme of white knitting wool which has been washed in warm water containing a little ammonia, rinse the wool several times in water and dry; a fine Titian-red colour is imparted to the wool

Uses.—Henna is used as a dye for the hair and for this purpose is often mixed with other substances.

LEPTANDRA

(Leptand.)

Leptandra

Synonyms—Black Root; Culvers Root.

Leptandra consists of the dried rhizome and roots of *Veronica virginica* Linn (Fam. Scrophulariaceæ), a tall perennial herb, abundant in Eastern and Central North America.

The hard, woody rhizome occurs in pieces about 5 centimetres in length and one centimetre in diameter; it is dark greyish-brown in colour and bears brown cataphyllary leaves; its upper surface bears small buds and the remains of aerial stems, which are encircled by scale leaf scars and are usually cup-shaped at the ends To the sides and under surface are attached numbers of stout roots which tend to divide into numerous fibrous pieces leaving the central strand of wood. The fracture is short; the smoothed, transverse surface shows a narrow, dark cortex, a paler ring of wood and a large dark pith The odour is slight, and the taste bitter and acrid.

Leptandra **contains** an amorphous bitter substance, 3 : 4-dimethoxy cinnamic acid, mannitol, dextrose, verosterol, cinnamic and *p*-methoxy-cinnamic acids in the form of esters, and a mixture of fatty acids

Standard.—Leptandra contains not more than 5 per cent of its stem and other foreign organic matter. Acid-insoluble ash, not more than 6 per cent.

Leptandra, in powder (Pulvis Leptandræ : Pulv. Leptand.), contains the constituents of Leptandra, and complies with the limit for acid-insoluble ash of the unground drug

Action and Uses.—Leptandra is a reputed cholagogue, and is said to promote the flow of bile without irritating the intestine. It has been recommended in chronic constipation. It may be administered as Extractum Leptandræ in pills, and is frequently combined with podophyllin or euonymin, extract of hyoscyamus or belladonna being added to prevent griping.

Dose. 1 to 4 grammes (¼ to 1 drachm).

Preparations

Extractum Leptandræ, B.P.C.—(Ext Leptand.)—Extract of Leptandra. *Syn.*—Leptandrin. A dry extract. Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

Tabellæ Leptandræ Compositæ, B.P.C.—(Tab Leptand. Co.)—Compound Tablets of Leptandra. *Syn.*—Tabellæ Laxativæ Compositæ; Vegetable Laxative Tablets. Each tablet contains 1 grain of compound extract of colocynth, ¼ grain each of extract of leptandra, jalap resin, resin of podophyllum, dry extract of hyoscyamus and extract of taraxacum, and oil of peppermint. Dose.– 1 to 3 tablets.

LIMONIS CORTEX

(Limon. Cort.)

Lemon Peel

Lemon peel consists of the outer part of the fresh pericarp of *Citrus Limonia* Osbeck (Fam. Rutaceæ), a small tree cultivated in the countries bordering the Mediterranean Sea. The fruit is gathered when green, afterwards ripening and becoming yellow in colour.

Externally, lemon peel is pale yellow in colour, the surface being glabrous but somewhat rough owing to the presence of large oil glands just beneath the epidermis; internally, it is white and pithy. The odour is strong and fragrant and the taste is pleasantly bitter.

The diagnostic **microscopical** characters are the numerous large, ovoid, lysigenous oil glands in the yellowish tissue just beneath the epidermis; the lacunous parenchyma of the pithy portion, consisting of stellately-branched cells; the numerous prisms of calcium oxalate; the small, scattered vascular bundles. Lemon peel **contains** volatile oil and hesperidin.

Standard, B.P.—Lemon peel contains only a small amount of the white spongy part of the pericarp on the inner surface.

Action and Uses.—Lemon peel is a bitter stomachic, but is used more as a flavouring agent than for this property. Dried lemon peel may be used in tropical and subtropical parts of the Empire for making preparations when the fresh peel cannot be obtained.

LIMONIS CORTEX SICCATUS.—Dried lemon peel is the dried, outer part of the pericarp of *Citrus Limonia* Osbeck. The peel occurs in the form of spiral bands about 1·5 centimetres wide, 2 to 3 millimetres thick, and often 20 or more centimetres long; certain pieces show the nipple-shaped apex of the fruit. The outer surface is brownish-yellow, rough from the presence of projections over the oil glands, and often slightly concave; the inner surface is white or whitish and somewhat lacunous; there is present only a small part of this inner white portion of the pericarp. The peel is brittle, and possesses a pleasant, aromatic odour and a bitter, aromatic taste. Dried lemon peel is used for the same purposes as fresh lemon peel.

Preparations

Syrupus Limonis, B.P.—(Syr. Limon.)—Syrup of Lemon. It contains the alcohol-soluble matter of 6 per cent. w/v of lemon peel with citric acid and syrup. It should be stored in a cool place in a container previously washed with boiling water. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Syrupus Succi Limonis, B.P.C.—(Syr. Succ. Limon.)—Syrup of Lemon Juice. Lemon juice, about 1 in 2, with a tincture of lemon peel and sucrose Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This syrup was included in the British Pharmacopœia, 1914, under the name of Syrupus Limonis.

Tinctura Limonis, B.P.—(Tinct Limon.)—Tincture of Lemon. 1 in 4, by maceration with alcohol (60 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LINUM
(Linum)
Linseed

Synonyms—Lini Semina: Flaxseed.

Linseed is the dried, ripe seeds of *Linum usitatissimum* Linn. (Fam. Linaceæ), a tall, erect annual cultivated in most temperate and tropical regions The fruit is a small, globular capsule containing about ten seeds which are separated when ripe.

The seeds are small, brown and glossy, with a minutely pitted surface; they are about 4 to 6 millimetres long and 2 to 2·5 millimetres in maximum width, elongated-ovoid and strongly flattened. They are rounded at one end and obliquely pointed at the other, near which, on one edge, is a slight depression in which both the hilum and the micropyle are situated. The embryo, consisting of two yellowish-white, flattened plano-convex cotyledons and a radicle, nearly fills the seed and is completely surrounded by a thin, whitish endosperm; both endosperm and embryo are oily. The drug is odourless and has a mucilaginous, oily taste.

The diagnostic **microscopical** characters are the isodiametric cells of the testa with mucilaginous outer walls; the cylindrical, collenchymatous cells of the middle layer of the seed coats; the single layer of yellowish-brown, longitudinally elongated, sclerenchymatous cells, about 120 to 190 microns long and 14 to 17 microns wide, with thick, lignified and pitted walls; the single layer of flattened, polygonal pigment cells with reddish-brown contents; the aleurone grains from the cotyledons, up to 20 microns in diameter, each with globoid and crystalloid; the abundant globules of fixed oil; the presence of an occasional starch grain.

Linseed **contains** from about 30 to 40 per cent. of fixed oil, about 6 per cent. of mucilage which occurs in the seed coat, and about 25 per cent. of proteins, together with wax, resin, sugar, phosphates, and a small quantity of the glycoside, linamarin (phaseolunatin). The unripe seeds contain an occasional starch grain.

Varieties.—The principal supplies are obtained from the Argentine, Russia, Canada, India, Holland, and the United States of America Linseed varies somewhat in appearance according to its source. In general, warm climates yield larger and paler seeds than cold climates.

Substitute.—A variety of linseed with pale yellowish seed coats is known as white linseed. Powdered linseed cake, left after extracting the oil from the seeds by pressure, is sometimes known as "linseed meal"; it is distinguished from the pharmacopœial linseed meal by its low yield of fixed oil, which is usually about 6 to 8 per cent.

Standard, B.P.—Linseed contains not more than 2 per cent. of foreign organic matter

Action and Uses.—Linseed is used in the preparation of Infusum Lini, which is administered as a demulcent in the treatment of cough, especially those forms due to irritation of the pharynx and upper part of the respiratory passages Infusion of linseed is also given as a demulcent drink in intestinal or urinary catarrhs, and a simple mucilage, prepared by pouring boiling water over linseed and straining, is used as an enema in cases of ulcerative colitis. Crushed linseed is used in the form of a poultice (Cataplasma Lini, Linseed Poultice), to apply warmth and moisture locally for the relief of superficial or deep-seated inflammation. The poultice mass may be prepared by adding 4 ounces of crushed linseed gradually to 10 fluid ounces of boiling water. It is usually enclosed in muslin, and the surface of the poultice may be smeared with oil to prevent it adhering to the skin.

Preparations

Infusum Lini, B.P.C.—(Inf. Lini)—Infusion of Linseed About 1 in 30. Dose.—30 to 120 millilitres (1 to 4 fluid ounces).

Linum Contusum, B.P.—(Linum Contus.)—Crushed Linseed. *Syn.*—Lini Semina Contusa; Linseed Meal Linseed, coarsely powdered, containing not less than 30 per cent. of fixed oil, and exhibiting only an occasional starch grain in the residue. Ash, not more than 5 per cent It should be recently prepared.

Mucilago Lini, B.P.C.—(Mucil. Lini)—Mucilage of Linseed 1 in 8.

LIQUOR AMMONIÆ FORTIS

(Liq. Ammon. Fort.)

Strong Solution of Ammonia

Strong solution of ammonia is an aqueous solution of ammonia, NH_3 (17·03), and may be prepared by heating a mixture of ammonium chloride and slaked lime and dissolving the resulting gas in water. It may be obtained from the ammoniacal liquors of gas works by distillation with slaked lime or synthetically from atmospheric nitrogen. Strong solution of ammonia occurs as a clear, colourless liquid with a very pungent, characteristic odour and a strongly alkaline reaction. It produces dense, white fumes when the vapour is brought into contact with the vapour of hydrochloric acid. It should be **stored** in well-stoppered bottles in a cool place.

Miscible with water in all proportions.

Standard, B.P.—Strong solution of ammonia contains not less

than 31·5 per cent. and not more than 33·5 per cent. w/w of NH_3. Specific gravity, 0·885 to 0·891. Residue on evaporation to dryness on a water-bath, not more than 0·01 per cent. w/v. Arsenic limit, 0·5 part per million. Lead limit, 1 part per million. It complies also with a limit test for tarry matter.

Action and Uses.—Ammonia, when inhaled, excites the medulla and the fifth nerve endings, causing acceleration of the heart, stimulation of respiration, and some vasoconstriction. The rationale of smelling salts depends upon these reflex effects. Its effects are therefore similar to those of ammonium chloride—mildly expectorant, diaphoretic and diuretic Ammonia is given **internally** in the form of Liquor Ammoniæ Dilutus or Spiritus Ammoniæ Aromaticus. Hypodermic injections of dilute solution of ammonia (2 to 6 minims) have been given for collapse. **Externally,** the dilute solution of ammonia is rubefacient and counter-irritant. It is used to neutralise insect stings; for snake bites it is injected into the site of the puncture and a dose may also be injected into the vein of the leg in urgent cases. In the form of liniment, it is used as a rubefacient and counter-irritant application for lumbago, joint affections, muscular pains, and in bronchitis; this preparation is known also as "hartshorn and oil." In the form of cloudy or household ammonia solution of ammonia is used as a cleansing agent for the skin and for domestic purposes generally; a suitable preparation may be prepared with 10 per cent. of ammonia and 1 per cent. of soap and is rendered opalescent by the addition of a soluble calcium salt.

The greatest care should be used in handling strong solution of ammonia, and in opening its containers; its concentrated vapour may cause inflammation of the air passages or spasm of the glottis with sudden death In cases of **poisoning** by solutions of ammonia, vinegar, lemon juice, or acetic acid, freely diluted, should be given. Demulcent drinks should be taken freely and an injection of morphine given if necessary

Preparations

Linimentum Ammoniæ, B.P.C.—(Lin Ammon.)—Liniment of Ammonia Dilute solution of ammonia, 25 per cent. v/v with oleic acid and liquid paraffin

This liniment replaces the liniment of the British Pharmacopœia, 1914, which contained 25 per cent. v/v of almond oil and 50 per cent. v/v of olive oil in place of the oleic acid and liquid paraffin

Liquor Ammoniæ Anisatus, B.P.C.—(Liq. Ammon. Anisat.)—Anisated Solution of Ammonia. *Syn.*—Liquor Ammonii Anisatus; Spiritus Ammoniæ Anisatus Dilute solution of ammonia, 1 in 6, with oil of anise and alcohol (90 per cent.). Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm)

Liquor Ammoniæ Dilutus, B.P.—(Liq. Ammon. Dil.)—Dilute Solution of Ammonia. It contains 10 per cent. w/w of NH_3 (limits, 9·5 to 10·5). Specific gravity, 0·958 to 0·9615. Arsenic limit 0·16 part per million Lead limit, 0·3 part per million. Residue on evaporation to dryness on a water-bath, not more than 0·005 per cent. It complies also with a limit test for tarry matter It should be stored in well-closed containers in a cool place. Dose.– 0·6 to 1·2 millilitres (10 to 20 minims)

LIQUOR ANTIMONII CHLORIDI

(Liq. Antim Chlorid.)

Solution of Antimonious Chloride

Synonym—Butter of Antimony.

Solution of antimonious chloride may be prepared by the action of hydrochloric acid on black antimony which has been purified until comparatively free from other metals, the clear solution being filtered and concentrated to the required specific gravity. It is a heavy liquid of a yellowish-red colour, this colour being partly due to the presence of large traces of iron. When mixed with excess of water, it deposits a white precipitate of antimony oxychloride.

Standard.—Solution of antimonious chloride contains not less than 17 and not more than 18 per cent. w/w of Sb Specific gravity, 1·465 to 1·475

Assay.—Mix about 0·5 millilitre, accurately weighed, with 20 millilitres of water, 5 grammes of sodium potassium tartrate and 2 grammes of sodium bicarbonate, and titrate with N/10 iodine; each millilitre of N/10 iodine is equivalent to 0·006088 gramme of Sb.

Uses.—Solution of antimonious chloride has been used as an escharotic for poisoned wounds and cancerous growths. It is now rarely used except in veterinary practice and in the manufacture of furniture polishes.

LIQUOR ERGOSTEROLIS IRRADIATI

Liq. Ergosterol. Irrad.)

Solution of Irradiated Ergosterol

Solution of irradiated ergosterol is a solution in arachis oil or other suitable vegetable oil of the product, or of the purified calciferol separated from it, obtained by irradiating a solution of ergosterol with ultra-violet light. Ergosterol, $C_{27}H_{41}OH,H_2O$, is a sterol obtained from yeast and also present in ergot. It may be dehydrated at 105°, but it quickly re-absorbs moisture from the air. It crystallises from alcohol in wide, monoclinic lamellæ, and from ether in monoclinic needles, melting between 162° and 164° It is strongly lævorotatory The irradiation may be carried out by surrounding a mercury vapour lamp with a spiral of silica tubing of 4 millimetres bore, through which a 0·3 per cent. solution of ergosterol in ether is allowed to pass at a rate of about 20 to 30 millilitres per minute. The solution of ergosterol before and after irradiation is kept in an atmosphere of nitrogen from which all traces of oxygen and carbon dioxide have been removed. The ether is removed by distillation under reduced pressure and the residue is treated with 90 per cent. alcohol when the greater part of the unchanged ergosterol remains undissolved.

Irradiated ergosterol is identified by its power to cure rickets produced experimentally in rats. It contains vitamin D, which has been isolated in pure, crystalline form and named calciferol. Calciferol melts between 114·5° and 117°; its antirachitic activity is equivalent to 40,000 International units per milligram. It is strongly dextrorotatory. Solution of irradiated ergosterol should be **stored** in well-closed containers in a cool place and protected from light.

Standard, B.P.—Solution of irradiated ergosterol contains in 1 gramme approximately 3000 units of antirachitic vitamin (vitamin D). The unit of vitamin D is the activity contained in a specified quantity of a solution of irradiated ergosterol issued by the National Institute for Medical Research, London, and adopted as the International standard by the Permanent Commission on Biological Standardisation of the League of Nations. The assay of solution of irradiated ergosterol is conducted by a contemporary comparison with the standard by a biological method which depends on its power to promote calcification in the bones of rats. The assay process may utilise either the curative or the prophylactic effect of the vitamin.

Action and Uses.—Vitamin D is essential for the normal calcification of bones during growth (i.e., it prevents the development of rickets), and during maturity (i.e., it prevents the development of osteoporosis). The absence of vitamin D from the diet is said to increase liability to dental caries. The low levels of calcium and phosphorus of the blood in rickets and osteoporosis are brought back to normal by giving solution of irradiated ergosterol. An adequate amount of calcium salts and phosphorus compounds in the diet is essential during the administration of vitamin D. Overdosage should be avoided since mild toxic symptoms have been attributed to large doses. Continued overdosage may cause abnormal deposition of calcium in various tissues of the body. It has been stated that the toxic dose is not far removed from the optimal curative dose. Liability to toxic effects of large doses of solution of irradiated ergosterol appears to be greater in normal subjects than in rachitic patients.

Dose.– Prophylactic, 1000 to 3000 units daily for an infant (0·3 to 1 millilitre, 5 to 15 minims); curative, 5000 to 10,000 units daily for an infant (1·5 to 3 millilitres, 25 to 50 minims).

Preparations

Emulsio Olei Arachis, B.P.C.—(Emuls. Ol. Arach.)—Emulsion of Arachis Oil. *Syn.*—Marylebone Cream (Improved). Each fluid drachm contains about ½ fluid drachm of arachis oil and solution of irradiated ergosterol equivalent to about 300 units of antirachitic activity. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Extractum Malti cum Vitaminis, B.P.C.—(Ext. Malt. c. Vitamin.)—Extract of Malt with Vitamins. Solution of vitamin A, 1 per cent. w/w, and solution of irradiated ergosterol, 1·5 per cent. w/w, in extract of malt. It is about 3 times as potent as extract of malt and cod-liver oil; 4 millilitres (1 fluid drachm) contains about 3000 units of vitamin A and 225 units of antirachitic activity (vitamin D). Dose.– 8 to 30 millilitres (½ to 1 fluid ounce)

LIQUOR FORMALDEHYDI
(Liq. Formaldehyd.)
Solution of Formaldehyde

Synonym—Formalin.

Solution of formaldehyde is an aqueous solution of formic aldehyde, HCHO (30·02), containing some methyl or ethyl alcohol, or both, to prevent polymerisation of the formaldehyde to solid paraformaldehyde, $(CH_2O)_3$. The general use of the synonym "formalin" is limited to Great Britain and Northern Ireland. Formaldehyde itself is a colourless, extremely irritating gas which is obtained by the dry distillation of calcium formate or by the catalytic oxidation of the vapour of methyl alcohol.

Solution of formaldehyde occurs as a colourless liquid with a characteristic, pungent, irritating odour and a burning taste. It reduces ammoniacal silver nitrate solution, yields hexamine when treated with solution of ammonia, and a formate when boiled with an alkali. When a trace of a dilute solution of formaldehyde is added to a solution containing 1 per cent. w/v of phenylhydrazine hydrochloride and a small quantity of potassium ferricyanide strongly acidified with hydrochloric acid, a brilliant red colour is produced. When two drops of solution of formaldehyde are added to sulphuric acid mixed with a small quantity of salicylic acid, a deep red colour is produced. When mixed with an equal volume of sodium hydroxide solution and boiled with resorcinol, formaldehyde yields a yellow colour, changing to red. When evaporated to dryness on a water-bath, solution of formaldehyde yields a white residue of paraformaldehyde. It should be **stored** in well-closed containers, in a moderately warm place.

Standard, B.P.—Solution of formaldehyde contains not less than 37 per cent. and not more than 41 per cent. w/v of CH_2O. Specific gravity, 1·080 to 1·095. It is neutral or slightly acid to litmus.

Action and Uses.—Solution of formaldehyde is a very powerful germicide; diluted with 200 parts of water it kills most micro-organisms. It reacts with proteins and when undiluted it has a caustic action on the tissues. Applied undiluted to the skin, it hardens it, ultimately rendering it impermeable. As a germicide, solution of formaldehyde is considered to be as effective as mercuric chloride, but owing to its irritant and destructive action its use is limited. Continuous inhalation of formaldehyde causes inflammation of the respiratory tract and may result in bronchitis and pneumonia. Undiluted solution of formaldehyde is sometimes applied to small patches of ringworm. A 1 or 2 per cent. solution of Liquor Formaldehydi in water has been used as a paint or spray in diphtheria and ozœna, while 1 part with 3 parts of glycerin is sometimes used as a paint in lupus vulgaris. As a mouth-wash or gargle, 1 part in 500 parts of water is suitable. A 0·05 per cent. solution of Liquor Formaldehydi in water may be used as an eye lotion. Solution of formaldehyde is used for disinfecting excreta, but it is not suitable for

preserving urine for subsequent examination. Liquor Formaldehydi Saponatus, suitably diluted, may be used as an antiseptic solution for instruments

For the disinfection of rooms, solution of formaldehyde may be used with a spray The gas may be liberated readily from the solution by adding 50 grammes of potassium permanganate or 100 grammes of chlorinated lime to each 100 millilitres. It is stated that the gas liberated from 5 ounces of the solution is sufficient to disinfect completely 1000 cubic feet of air space when the room is closed for ten hours The solid polymeride may be used if vaporised with a suitable lamp, instead of the solution (see Paraformaldehydum). Formaldehyde solution does not injure metals or fabrics. A 2 per cent. solution in water is used as a preservative for pathological specimens This is preferable to alcohol because the specimens retain their colour. As a hardening agent for microscopical purposes, a 4 per cent. aqueous solution is used. For preserving corpses for dissection, a 10 per cent. solution is commonly used. A 1 in 5 dilution may be applied to insect bites; a 1 in 20 dilution exposed in a shallow container is said to kill flies When a 1 per cent. solution of formaldehyde is prescribed, 1 volume of Liquor Formaldehydi diluted to 100 volumes with water should be dispensed

Formaldehyde renders protein less susceptible to the action of pepsin. Advantage is taken of this fact in the preparation of glutoid capsules. These consist of gelatin which has been dipped in formaldehyde solution. Solution of formaldehyde is **incompatible** with ammonia and oxidising agents. **Poisoning** by formaldehyde is characterised by severe pain throughout the alimentary tract, which may be followed by collapse and death; in non-fatal cases the liver and kidneys may become affected. Poisoning by inhalation produces pneumonia and bronchitis. Treatment consists of the use of the stomach pump or an emetic and administration of aromatic spirit of ammonia.

Preparation

Liquor Formaldehydi Saponatus, B.P.C.—(Liq. Formaldehyd. Sap.)—Solution of Formaldehyde with Soap. Soft soap, 1 in $2\frac{1}{2}$, and solution of formaldehyde 1 in 5, in alcohol (90 per cent.) and distilled water.

This solution was included in the British Pharmacopœia, 1914.

LIQUOR GLYCERYLIS TRINITRATIS

(Liq. Glyc. Trinit.)

Solution of Glyceryl Trinitrate

Synonyms—Solutio nitroglycerini spirituosa I.A.; Liquor Trinitrini; Solution of Trinitrin; Solution of Nitroglycerin; Spiritus Glycerylis Nitratis.

Solution of glyceryl trinitrate is a solution of glyceryl trinitrate in alcohol (90 per cent.). Glyceryl trinitrate, $C_3H_5(NO_3)_3$ (227·1), is the nitric acid ester of glycerin and is prepared by treating dehydrated

glycerin with a mixture of fuming nitric acid and sulphuric acid. After purification, glyceryl trinitrate is obtained as an odourless, colourless liquid with a sweet, aromatic, pungent taste. It solidifies at 8° and, in the solid condition, is dangerous to handle, readily exploding on percussion and sometimes spontaneously. While liquid, contact with a flame neither ignites nor explodes it, but contact with red-hot iron does. When absorbed by diatomite it constitutes the explosive, dynamite. The name "Liquor Glonoini" is sometimes used for solution of glyceryl trinitrate.

Solution of glyceryl trinitrate occurs as a clear, colourless liquid, neutral to litmus, and having a specific gravity of 0·836 to 0·841. It yields a turbid mixture when mixed with twice its volume of distilled water, the glyceryl trinitrate being thrown out of solution and, after standing, separating as an oily liquid. In contact with alkalis the glyceryl trinitrate is slowly decomposed and, on the subsequent addition of potassium iodide solution and dilute sulphuric acid, iodine is liberated and brown fumes evolved.

Standard, B.P.—Solution of glyceryl trinitrate contains not less than 0·9 per cent. and not more than 1·1 per cent. w/v of $C_3H_5(NO_3)_3$. Alcohol content, 88 to 90 per cent. v/v of ethyl alcohol.

Action and Uses.—Glyceryl trinitrate is absorbed unaltered by the stomach, and is supposed to be converted into nitrite in the body. The action of glyceryl trinitrate resembles that of amyl nitrite, but is less rapidly produced and is more prolonged. Solution of glyceryl trinitrate is employed to reduce blood pressure in arterial degeneration and chronic nephritis. It is also given to relieve spasmodic asthma, the difficult breathing of acute bronchitis, and in some forms of vomiting, including sea-sickness, and is used in angina pectoris, but its use should be avoided in the angina due to coronary thrombosis. Tolerance of the drug is soon established and, after long-continued use, as much as 4 millilitres (1 fluid drachm) has been given. Glyceryl trinitrate is often administered in the form of Tabella Glycerylis Trinitratis which should be chewed, not swallowed whole.

Dose.– 0·03 to 0·12 millilitre ($\frac{1}{2}$ to 2 minims).

Preparation

Tabella Glycerylis Trinitratis, B.P.—(Tab. Glyc. Trinit.)—Tablet of Glyceryl Trinitrate. *Syn.*—Tabellæ Trinitrini; Trinitrin Tablets; Tablets of Nitroglycerin. Each tablet contains 0·0005 gramme (about $\frac{1}{130}$ grain) of glyceryl trinitrate in a chocolate basis. Dose.– 1 or 2 tablets.

LIQUOR HYDROGENII PEROXIDI

(Liq. Hydrog. Perox.)

Solution of Hydrogen Peroxide

Synonym—Liquor Hydrogenii Dioxidi.

Solution of hydrogen peroxide is an aqueous solution of hydrogen

peroxide, H_2O_2 (34·02), and may be prepared by the action of dilute sulphuric acid upon barium peroxide suspended in water, at a temperature below 10°. It occurs as a colourless, odourless liquid, with a slightly acid taste. It is comparatively stable in the presence of a slight excess of acid, but it readily decomposes when rendered alkaline and when in contact with oxidisable substances or certain metals. When heated, it decomposes with evolution of oxygen. When one drop is shaken with a mixture of ether and an acidified solution of potassium chromate, the ethereal layer, after separation, is coloured blue. Solution of hydrogen peroxide is met with in commerce as 10, 12, 20 and 30 "volume", the number indicating the volumes of oxygen obtainable from one volume of the preparation. A 100 volume solution is also obtainable, containing 30 per cent. w/v of H_2O_2, and is more stable than the weaker forms. It should be **stored** in a bottle made of neutral glass, closed with a glass stopper or a paraffined cork, in a cool place, and protected from light.

Standard, B.P.—Solution of hydrogen peroxide contains not less than 2·5 per cent. and not more than 3·5 per cent. w/v of H_2O_2, corresponding to about 10 times its volume of available oxygen. Residue on evaporation on a water-bath, not more than 0·2 per cent. w/v. It complies also with limit tests for barium and for acidity.

Action and Uses.—Solution of hydrogen peroxide owes its efficacy as an antiseptic and disinfectant to the readiness with which it liberates oxygen in the presence of living or dead tissue and bacteria. It does not combine with albumin, and is non-poisonous. It is applied locally to wounds, and used to cleanse discharging ulcers, abscesses, and venereal sores. It is also used as drops for the ear, often with an equal volume of alcohol (95 per cent.) or industrial methylated spirit, and stronger solutions are employed in dental practice to cleanse septic cavities, etc. In washing out empyemal or serous cavities, care is necessary on account of the large volume of oxygen rapidly liberated.

For external use in skin diseases, it may be applied mixed with glycerin and rose water, or a cream may be prepared with anhydrous wool fat and 2 per cent. of the solution. A 1 in 8 solution may be used as a spray to the throat in diphtheria and scarlet fever, and as a disinfectant gargle or mouth-wash. A 1 in 10 solution has been used as an eye lotion. Diluted with water (1 in 4) it has been used to arrest epistaxis, and as a wash to brush the teeth and destroy dental discharges. It is occasionally used internally, when it should be well diluted. It is also used to bleach hair and delicate fabrics. Strong solutions of the peroxide produce irritating "burns" on the skin, but the pain disappears in about an hour and no blister is left. It is **incompatible** with most organic substances and with alkalis, iodides, permanganates and oxidisable substances.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

ÆTHER OZONICUS.—Ozonic ether is an ethereal solution of hydrogen peroxide prepared by shaking a strong solution of the peroxide with ether and separating the ethereal layer. With potassium permanganate solution and dilute sulphuric acid it yields about five volumes of oxygen. It is not miscible with water, but mixes readily with alcohol. Ozonic ether is occasionally given in mixtures in the treatment of whooping cough, solution being effected by the addition of alcohol. It may be used as a test for blood; when some freshly prepared tincture of guaiacum is added to a liquid containing traces of blood, the subsequent addition of ozonic ether causes the formation of a blue oxidation product, which colours the ethereal layer. Dose.– 1 to 4 millilitres ($\frac{1}{4}$ to 1 fluid drachm).

LIQUOR VITAMINÆ-A

(Liq. Vitamin. A)

Solution of Vitamin A

Solution of vitamin A is a solution in arachis oil or other suitable vegetable oil of a concentrate obtained from mammalian or other suitable livers. It may be prepared by the following process. The liver is chopped up and saponified with alcoholic potash; the unsaponifiable matter is extracted with ether, care being taken to prevent oxidation, the ether is removed, and the residue dissolved in twice its weight of methyl alcohol and cooled to 0°, when most of the cholesterol crystallises out and is removed; finally the methyl alcohol is removed by distillation.

A concentrate so prepared from mammalian livers contains a very small amount of vitamin D, but may contain more vitamin A than a concentrate prepared in the same way from cod-liver oil. The concentrate is dissolved in the oil and the solution diluted to the required strength. A guide to the vitamin A content may be obtained by applying the antimony trichloride test as described in the British Pharmacopœia and determining the relative concentration which gives 5 blue units in a Lovibond tintometer. The "blue value" is the number of blue units, calculated from the result, that would be given by 0·04 gramme of substance. The vitamin A content of preparations may also be standardised by spectrographic means, either by measuring the intensity of absorption of the characteristic band in the ultra-violet portion of the spectrum, or by measuring the intensity of absorption of either or both of the two bands in the visible spectrum produced by the action of antimony trichloride on the vitamin. It should be **stored** in well-closed containers, in a cool place and protected from light.

Standard.—Solution of vitamin A contains in 1 gramme approximately 60,000 units. The unit of vitamin A is the vitamin A activity of 0·001 milligram of a sample of carotene kept in the National Institute for Medical Research, London, and provisionally adopted as the International standard by the Permanent Commission on Biological Standardisation of the League of Nations. The assay of a solution of vitamin A is conducted biologically by a contemporary comparison with the standard.

Action and Uses.—The mode of action of vitamin A is unknown. Its deficiency in the diet leads to general degenerative changes in the epithelium of the alimentary canal, which cause defective absorption. Inflammatory changes in the structure of the eye, known as xerophthalmia, are also produced, and can be cured by the administration of this vitamin. There is often a general lowering of the resistance of the body, particularly of the respiratory tract, to infective agents. Vitamin A has, in fact, been called the anti-infective vitamin It has been shown experimentally that diets rich in vitamin A prevent degeneration of the spinal cord which occurs when diets containing ergot are eaten. Lathyrism in dogs fed on *Lathyrus sativus* may be prevented by giving yellow maize which is rich in vitamin A, but not by white maize which is almost devoid of vitamin A.

Therapeutically, vitamin A is indicated for children during the period of growth, for women during pregnancy and lactation, and to increase resistance to bacterial infection. This vitamin has been given as a prophylactic against puerperal sepsis in doses of 10,000 units daily throughout pregnancy, or 50,000 units daily during the last month of pregnancy. For the treatment of puerperal sepsis, 450,000 units daily in twelve doses may be given; as a general safeguard against infections of the respiratory tract, 5000 to 15,000 units may be given.

Dose.– 5000 to 50,000 units.

Preparation

Extractum Malti cum Vitaminis, B.P.C.—(Ext. Malt. c. Vitamin.)—Extract of Malt with Vitamins. Solution of vitamin A, 1 per cent. w/w, and solution of irradiated ergosterol, 1·5 per cent. w/w, in extract of malt. It is about 3 times as potent as extract of malt and cod-liver oil; 4 millilitres (1 fluid drachm) contains about 3000 units of vitamin A and 225 units of antirachitic activity (vitamin D). Dose.– 8 to 30 millilitres (½ to 1 fluid ounce)

LITHII ACETYLSALICYLAS

(Lith. Acetylsalicyl.)

Lithium Acetylsalicylate

$C_9H_7O_4Li = 186·0$

Lithium acetylsalicylate, $CH_3CO·OC_6H_4·COOLi$, may be prepared by neutralising a solution of acetylsalicylic acid in an organic solvent with lithium carbonate and precipitating the salt by the addition of ether. It occurs as a slightly hygroscopic powder, decomposing in moist air. The aqueous solution is gradually hydrolysed, forming lithium salicylate and acetic acid. It should be **stored** in well-stoppered bottles.

Soluble in water (1 in 1) and alcohol (1 in 4).

Standard.—Lithium acetylsalicylate, determined by the method for Lithii Citras, contains not less than 95 per cent. of $C_9H_7O_4Li$; 1 gramme

of Li_2SO_4 is equivalent to 3·384 grammes of $C_9H_7O_4Li$. Arsenic limit. 5 parts per million. Lead limit, 10 parts per million.

Action and Uses.—The action of lithium acetylsalicylate is virtually that of acetylsalicylic acid. On account of its gradual hydrolysis in aqueous solutions it is best **administered** in powders, cachets or tablets.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

LITHII BENZOAS

(Lith. Benz.)

Lithium Benzoate

$C_7H_5O_2Li = 128·0$

Lithium benzoate, $C_6H_5·COOLi$, may be prepared by stirring lithium carbonate into distilled water and adding a sufficient quantity of benzoic acid to the warmed liquid. The resulting solution is filtered, evaporated to a small bulk, allowed to crystallise, and the crystals dried at the ordinary temperature, or the solution may be evaporated and the residue dried at 30° to 35° It occurs as a light, white powder or in small, shining, crystalline scales, odourless or with a slight benzoin-like odour, and having a sweetish, saline taste. It is slightly unctuous to the touch. On heating, the salt fuses, and at a higher temperature it carbonises, giving off inflammable vapours having a benzoin-like odour; on complete ignition, it leaves a white residue of lithium carbonate, which has an alkaline reaction and colours a non-luminous flame crimson. A 10 per cent. aqueous solution gives with ferric chloride solution a buff-coloured precipitate, and with dilute hydrochloric acid a white crystalline precipitate of benzoic acid.

Soluble in water (about 1 in 3), boiling water (about 1 in 2), alcohol (1 in 15), and boiling alcohol (1 in 10).

Standard.—Lithium benzoate, determined by the method of the British Pharmacopœia for Sodii Benzoas, contains not less than 98·5 per cent. of $C_7H_5O_2Li$; each millilitre of N/2 sulphuric acid is equivalent to 0·06399 gramme of $C_7H_5O_2Li$. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million It complies with the limit tests for chlorides, sulphates and chlorinated compounds in Sodii Benzoas

Action and Uses.—Lithium benzoate resembles in its action the benzoates of sodium and potassium. It is antiseptic and diuretic, and is employed in cystitis and gonorrhœa. The acid radical is excreted as hippuric acid in the urine and therefore this salt of lithium does not render the urine less acid, as does the citrate. Although formerly credited with limiting uric acid formation it has no such action. Lithium benzoate is commonly **administered** in mixture form, or enclosed in a cachet to be swallowed with a large draught of water.

Dose.– 0·3 to 1 gramme (5 to 15 grains)

LITHII BROMIDUM
(Lith. Brom.)
Lithium Bromide
$LiBr = 86{\cdot}86$

Lithium bromide may be prepared by neutralising a hot solution of hydrobromic acid with lithium carbonate. The solution obtained, which must be faintly acid after all carbon dioxide is driven off, is filtered and evaporated, and the residue dried at 120°. It may be obtained in crystals by evaporating its syrupy solution over concentrated sulphuric acid. The amount of water of crystallisation varies according to the temperature of crystallisation, but the commercial salt contains less than one molecule. It occurs as a more or less granular, very deliquescent, odourless, white, crystalline powder, having a somewhat sharp and bitter taste. On heating, the salt fuses, and slowly volatilises as the temperature is raised.

Soluble in water (5 in 3), boiling water (10 in 3), alcohol and ether-alcohol.

Standard.—Lithium bromide, determined by the method of the British Pharmacopœia for Potassii Bromidum, and calculated on the substance dried at 160°, contains not less than 98 per cent. of LiBr; each millilitre of N/10 silver nitrate is equivalent to 0·008686 gramme of LiBr. Loss, on drying at 160°, not more than 15 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. 1 gramme complies with the limit test for sulphates. It complies with the limit tests for bromate, barium, chloride, and alkali in Potassii Bromidum. 1 millilitre of chloroform, shaken with a solution of 0·5 gramme in 10 millilitres of water and 2 drops of ferric chloride solution, does not acquire a violet colour (limit of iodide).

Action and Uses.—Lithium bromide has similar properties to potassium bromide, but is liable to cause digestive disturbances. It is used in epilepsy and gout. It is best **administered** in mixture form, flavoured with aromatic syrup.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

LITHII CARBONAS
(Lith. Carb.)
Lithium Carbonate
$Li_2CO_3 = 73{\cdot}88$

Lithium carbonate may be obtained by various processes from lepidolite and other mineral ores containing lithium. It occurs as a white, odourless, amorphous powder, or in minute, crystalline grains, having a slightly alkaline taste. Its aqueous solution is alkaline to litmus. On heating to dull redness, it melts to a transparent liquid, losing a

portion of its carbon dioxide and becoming partly converted into oxide Moistened with hydrochloric acid and heated on a platinum wire it imparts a crimson colour to the flame.

Soluble in water (1 in 80) and boiling water (1 in 140); more soluble in water containing carbon dioxide; insoluble in alcohol

Standard.—Lithium carbonate contains not less than 98·5 per cent. of Li_2CO_3, calculated on the substance dried at 100° Loss on drying at 100°, not more than 1 per cent Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. 1 gramme dissolved in 10 millilitres of dilute nitric acid complies with the limit test for chlorides 1 gramme dissolved in 10 millilitres of dilute hydrochloric acid complies with the limit test for sulphates Dissolve 1 gramme in 30 millilitres of N/1 hydrochloric acid and neutralise with solution of ammonia, filter if necessary and divide into two portions: to one portion add 1 millilitre of ammonium oxalate solution; no turbidity or precipitate is produced on standing for five minutes (limit of calcium): to the second portion add 1 millilitre of sodium phosphate solution; no precipitate is produced on standing for five minutes (limit of magnesium).

Assay.—Dissolve about 1 gramme, accurately weighed, in 50 millilitres of N/1 sulphuric acid and titrate the excess of acid with N/1 sodium hydroxide, using methyl orange as indicator; each millilitre of N/1 sulphuric acid is equivalent to 0·03694 gramme of Li_2CO_3.

Action and Uses.—Lithium carbonate resembles the carbonates of sodium and potassium in its action It is diuretic and has been employed to increase the alkalinity of the blood and to prevent the deposition of insoluble urates or to remove deposits already formed. It is, however, extremely doubtful whether, in the concentration obtained, lithium salts have any action in this latter direction. The urates of lithium are more soluble than the corresponding salts of sodium or potassium, and it is upon this fact that the use of lithium salts in gout and rheumatism is founded. Its employment in medicine has no rational foundation, since the soluble urate cannot exist either in the body or in the urine in the presence of sodium and potassium ions. Lithium carbonate is **administered** in the form of lithia water, or in dilute solution in distilled water, copious draughts being taken, preferably on an empty stomach.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

LITHII CHLORIDUM

(Lith. Chlorid.)

Lithium Chloride

$LiCl = 42·40$

Lithium chloride may be prepared by neutralising hydrochloric acid

with lithium carbonate, or by decomposing an aqueous solution of lithium sulphate with barium chloride When the solution is evaporated to dryness the anhydrous salt is produced, but if evaporated slowly over concentrated sulphuric acid the salt, $LiCl,H_2O$, may be obtained. Lithium chloride occurs in white, octahedral crystals, or more frequently as a crystalline powder, or in masses, which are deliquescent, and have a taste similar to that of sodium chloride It forms a crystalline compound with alcohol Evaporation of an aqueous solution is accompanied by slight decomposition, traces of hydrochloric acid being lost and the solution becoming alkaline. At a red heat it fuses to a clear liquid, giving off some chlorine; at a higher temperature it is volatilised. Alcohol dissolves lithium chloride from an admixture with sodium and potassium chlorides. It should be **stored** in well-closed containers

Readily **soluble** in water (2 in 3), alcohol (1 in 30) and ether-alcohol

Standard.—Lithium chloride, determined by the method of the British Pharmacopœia for Sodii Chloridum, contains not less than 99 per cent. of LiCl, calculated on the salt dried at 100°; each millilitre of N/10 silver nitrate is equivalent to 0·004240 gramme of LiCl Loss, on drying at 100°, not more than 5 per cent Arsenic limit, 5 parts per million. Lead limit, 10 parts per million 1 gramme complies with the limit test for sulphates

Action and Uses.—Lithium chloride has the typical salt action of the chlorides of the alkali metals, but is rarely used medicinally It is diuretic and is occasionally employed in very dilute solution in gout and rheumatism. A 2 per cent. w/v solution in water is used for medical ionisation

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

LITHII CITRAS

(Lith. Cit.

Lithium Citrate

$C_6H_5O_7Li_3,4H_2O = 281·9$

Lithium citrate may be prepared by neutralising a solution of citric acid with lithium carbonate, filtering and crystallising the solution. It occurs in somewhat deliquescent, odourless, white crystals, having a cooling, slightly saline taste The aqueous solution is faintly alkaline to litmus. Lithium citrate loses three-fourths of its water of crystallisation at 100°, but requires a temperature of 150° to 160° to render it anhydrous Heated to redness it chars, giving off inflammable vapours and finally leaving a white residue of lithium carbonate. When too high a temperature is used during incineration, some of the carbonate is converted to oxide.

Soluble in water (1 in 2); almost insoluble in alcohol and ether.

Standard.—Lithium citrate contains not less than 98·5 per cent. of $C_6H_5O_7Li_3,4H_2O$ Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. 1 gramme complies with the limit tests for chlorides and sulphates

Assay.—Ignite about 1 gramme, accurately weighed, add an excess of sulphuric acid, re-ignite and weigh the residue of Li_2SO_4; 1 gramme of residue is equivalent to 1·710 gramme of $C_6H_5O_7Li_3,4H_2O$.

Action and Uses.—Lithium citrate resembles in its action the citrates of sodium and potassium, and is excreted in the urine as carbonate. It increases the alkalinity of the blood, and renders the urine less acid. For the reasons stated under Lithii Carbonas, it is largely employed in gout and rheumatism, being often preferred to the carbonate on account of its greater solubility in water. It is **administered** in solution with large draughts of water, in tablets dissolved in water, or as Lithii Citras Effervescens.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Preparation

Lithii Citras Effervescens, B.P.C.—(Lith. Cit. Efferv.)—Effervescent Lithium Citrate About 1 in 20. Dose.– 4 to 8 grammes (1 to 2 drachms).

Effervescent lithium citrate was included in the British Pharmacopœia, 1914.

LITHII IODIDUM

(Lith. Iod.)

Lithium Iodide

LiI = 133·9

Lithium iodide may be prepared by neutralising a solution of hydriodic acid with lithium carbonate, filtering, evaporating, and drying the residue at 100° to 105°. It occurs as irregular, deliquescent, odourless, white or yellowish-white masses, and has a bitter, saline taste. On keeping it becomes yellowish in colour and should be **stored** in well-closed containers. The aqueous solution is neutral or faintly alkaline, and on concentration over sulphuric acid deposits crystals of the composition, $LiI,3H_2O$, which melt between 72° and 73°.

Readily **soluble** in water and alcohol.

Standard.—Lithium iodide, determined by the method of the British Pharmacopœia for Potassii Iodidum, contains not less than 99 per cent. of LiI, calculated on the salt dried at 120°; each millilitre of M/20 potassium iodate is equivalent to 0·01339 gramme of LiI Loss on drying at 120°, not more than 10 per cent Arsenic limit, 5 parts per million. Lead limit, 10 parts per million

Action and Uses.—Lithium iodide resembles in its properties the iodides of potassium and sodium. It is occasionally employed in place of these salts in chronic gout and rheumatism, and is administered in dilute aqueous solution. It is also employed in aqueous solution (25 per cent.) in pyelography

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

LITHII SALICYLAS

(Lith. Salicyl.)

Lithium Salicylate

$C_7H_5O_3Li = 144·0$

Lithium salicylate, $C_6H_4(OH)\cdot COOLi$, may be prepared by heating on a water-bath, to a temperature not above 60°, a mixture of lithium carbonate, salicylic acid and water. The resulting liquid is evaporated at about 60°, and the residue dried. Lithium salicylate occurs as an odourless, white or greyish-white hygroscopic, crystalline powder, which exhibits needle-shaped crystals under the microscope, and has a nauseating, sweet taste. The aqueous solution should be colourless, with a faintly acid reaction. On heating, the salt decomposes, emitting an odour of phenol and leaving an alkaline residue.

Soluble in water (4 in 3), alcohol (1 in 2) and ether.

Standard.—Lithium salicylate, determined by the method of the British Pharmacopœia for Sodii Salicylas, contains not less than 98·5 per cent. of $C_7H_5O_3Li$, calculated on the salt dried at 120°; each millilitre of N/2 sulphuric acid is equivalent to 0·07198 gramme of $C_7H_5O_3Li$. Loss on drying at 120°, not more than 3 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. It complies with the limit tests for free acid, chloride and sulphate in Sodii Salicylas.

Action and Uses.—Lithium salicylate has properties resembling those of sodium salicylate. The salicylic radical temporarily increases the excretion of uric acid besides relieving the pain and stiffness of rheumatic joints. A 30 per cent. w/v solution of lithium salicylate in doses up to 4 millilitres (60 minims) is used as a sclerosing agent for the injection treatment of varicose veins; a local anæsthetic is sometimes added. Lithium salicylate is best **administered** in aqueous solution, well diluted. It is incompatible with alkali carbonates, free ammonia and acids

Dose.– 0·6 to 2 grammes (10 to 30 grains).

LOBELIA
(Lobel.)
Lobelia

Synonyms—Lobelia herba I.A.; Indian Tobacco.

Lobelia consists of the dried. aerial parts of *Lobelia inflata* Linn. (Fam. Campanulaceæ), an erect, annual herb indigenous to, and cultivated in, the Eastern United States of America. The plant is cut down when the lower fruits are nearly ripe, and dried.

The stems are green in colour, often with a purplish tint, rounded, hairy and winged in the upper part, channelled, angled and nearly glabrous below; they bear unicellular hairs up to about 1·2 millimetres in length and alternate leaves or leaf-scars. The leaves are pale green, broadly ovate to ovate-lanceolate in outline and vary in length from about 3 to 8 centimetres; the margin is irregularly toothed and the lamina bears scattered, bristly hairs, especially on the veins of the lower surface. The fruit is an inflated, ovoid or ellipsoidal, bilocular capsule, containing, when ripe, numerous brown, ovoid, reticulate seeds about 0·5 to 0·7 millimetre long and about 0·3 millimetre wide. Lobelia has a slight and somewhat irritating odour; the taste, which is at first slight, becomes burning and acrid when the drug is chewed.

The diagnostic **microscopical** characters are the elongated-polygonal, highly refractive, lignified, anticlinal walls of the seed epidermis; the conical, unicellular, or rarely 2-celled, trichomes with thin, warty walls and usually about 300 microns, but sometimes as much as 1·2 millimetres, long; the straight-walled, papillose, upper epidermal cells of the leaves; the abundant minute drops of oil scattered throughout the mesophyll; the anastomosing laticiferous vessels of the stem and leaf; the lignified and pitted parenchyma of the pith; the water-pores, usually about 9 in number, on the upper surface of most of the teeth of the leaves; the spherical pollen grains with smooth extine and three pores.

Lobelia **contains** lobeline, $C_{22}H_{27}O_2N$, lobelanine, lobelanidine and a number of other alkaloids; the most important is lobeline. The drug also contains a neutral, crystalline substance, inflatin, and lobelic acid.

Standard, B.P.—Lobelia contains not more than 60 per cent. of stems and not more than 2 per cent. of foreign organic matter. Acid-insoluble ash, not more than 5 per cent.

Lobelia, in powder (Pulvis Lobeliæ : Pulv. Lobel.), contains the constituents and possesses the diagnostic microscopical characters of Lobelia, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Lobelia is used for its action in depressing the vasomotor centre and peripheral vagus, thus producing dilatation of the bronchioles by relaxing the bronchial muscles. Lobeline has an action very closely resembling that of nicotine; it first excites nerve cells and then paralyses them. It has been used as an antidote to poisoning by opium, barbitone, carbon monoxide, etc., in asphyxia during surgical

anæsthesia, and in the paralysis of the respiratory centre occurring during lumbar anæsthesia. For these purposes it may be administered by intramuscular injection in doses of 0·003 to 0·009 gramme ($\frac{1}{20}$ to $\frac{3}{20}$ grain). The stimulation is pronounced, but transient.

Lobelia is given in spasmodic asthma, in the dyspnœa of chronic bronchitis, and in other affections of the respiratory passages; it should not be employed when there is cardiac disease. Lobelia is also used as an expectorant in laryngeal and bronchial catarrh. Its action in spasmodic asthma is enhanced by combination with sodium iodide or bromide. Large doses are diuretic, cathartic and emetic, and may cause collapse through medullary paralysis. It is an ingredient of Pulvis Lobeliæ Compositus and other powders intended to be burnt for the relief of asthma, but the use of such powders is not to be recommended owing to the vicious circle set up by the irritant fumes resulting from combustion. For internal use, the simple tincture and ethereal tincture are administered. In cases of **poisoning** by lobelia, the stomach should be evacuated and stimulants given.

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

Preparations

Mistura Lobeliæ et Stramonii Composita, B.P.C.—(Mist. Lobel. et Stramon. Co.)—Compound Mixture of Lobelia and Stramonium. Each fluid ounce contains 4 grains of ammonium carbonate, 5 grains of potassium iodide and 10 minims each of ethereal tincture of lobelia and tincture of stramonium, in chloroform water. Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

Pulvis Lobeliæ Compositus, B.P.C.—(Pulv. Lobel. Co.)—Compound Lobelia Powder. Equal parts of lobelia, stramonium and tea, impregnated with potassium nitrate and oil of anise.

Pulvis Stramonii Compositus, B.P.C.—(Pulv. Stramon. Co.)—Compound Stramonium Powder. Stramonium, 1 in 2, with lobelia, anise and tea, impregnated with potassium nitrate and oil of eucalyptus.

Tinctura Lobeliæ Ætherea, B.P.—(Tinct. Lobel. Æther.)—Ethereal Tincture of Lobelia. 1 in 5, by percolation with spirit of ether. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Tinctura Lobeliæ Simplex, B.P.C.—(Tinct. Lobel. Simp.)—Simple Tincture of Lobelia. *Syn.*—Tinctura Lobeliæ. 1 in 8, in alcohol (60 per cent.) Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Tinctura Lobeliæ I.A. is prepared with alcohol (70 per cent.) from 10 per cent. w/w of lobelia.

LUPULINUM
(Lupulin.)

Lupulin

Lupulin consists of the glandular trichomes separated from the strobiles of *Humulus Lupulus* Linn. (Fam. Cannabinaceæ). The glands, which are distributed over the bases of the bracts, over the

perigones, and, to a less degree, over the stipules, may be separated by shaking and beating the hops and sifting the resulting powder.

The drug forms a granular, golden-yellow powder, which darkens with age to yellowish-brown. The odour is strong and characteristic, valerian-like in old samples, and the taste is bitter and aromatic. **Microscopically,** the glands are more or less rounded in shape, 100 to 250 microns in diameter; the lower portion consists of a single, hemispherical, concave layer of cells, the delicate cuticle of which has been raised by the oleo-resinous secretion to form a domed covering.

Lupulin **contains** about 3 per cent. of volatile oil, which consists chiefly of the sesquiterpene, humulene, together with various oxygenated bodies, to which the oil owes its peculiar odour. Other constituents are the crystalline principles, humulone and lupulone, the yellow crystalline principles, xanthohumol and choline, resin and wax.

Adulterants.—Inferior qualities of lupulin often consist of sweepings from the floors of hop kilns.

Standard.—Lupulin yields not more than 40 per cent. of ether-insoluble matter. Ash, not more than 14 per cent.

Action and Uses.—Lupulin is an aromatic bitter, and is reputed to be mildly sedative. It is occasionally **administered** as a hypnotic in pills, with dilute alcohol as an excipient, or in capsules or cachets.

Dose.—0·12 to 0·3 gramme (2 to 5 grains).

LUPULUS
(Lupul.)

Lupulus

Synonyms—Hops; Humulus; Strobili Lupuli.

Lupulus consists of the dried strobiles of the hop plant, *Humulus Lupulus* Linn. (Fam. Cannabinaceæ), collected from cultivated plants. The hop is a dicœcious, climbing plant, growing in Europe generally, and largely cultivated in South-Eastern England, Belgium, Germany, Russia, California, etc. Lupulus should be **stored** in closed containers and protected from light.

The strobiles are about 3 centimetres long, and ovoid or flattened-ovoid in shape. They consist of a hairy, zigzag axis, 12 to 16 millimetres long, carrying a number of imbricated, pale yellowish-green, ovate, membranous bracts and stipules, the bracts being twice as numerous as the stipules. In the axil of each bract is a small achenial fruit, over which the margin is folded; the stipules are flat, and without fruits. The bracts and stipules are about 15 to 30 millimetres long and 5 to 10 millimetres wide. The perigones and the bases of both the bracts and stipules are sprinkled with minute, shining glands (see Lupulinum).

Recently dried lupulus possesses a bitter, aromatic taste and a strong characteristic, aromatic odour which gradually becomes distinctly unpleasant as the drug is kept, the change being ascribed to the oxidation of the resin with production of valeric acid; on this account, only recently dried material should be used, which can be recognised by its odour and distinct greenish colour.

Lupulus **contains** volatile oil, of which it yields about 0·3 to 1·0 per cent. (specific gravity, 0·840 to 0·890; optical rotation, −1° to +2°; refractive index, 1·470 to 1·495). Light petroleum extracts a soft resin (7 to 14 per cent.), and ether, a hard resin. The bitterness appears to be due to a number of substances, of which two, lupulone and humulone, have been obtained crystalline. Lupulus also contains a yellow, crystalline body, xanthohumol, a saturated acid, lactaric acid, together with hentriacontane, ceryl alcohol and cerotic acid. The leafy organs contain about 5 per cent. of tannin, which is not a constituent of the glands.

Standard.—Lupulus contains not more than 2 per cent. of foreign organic matter. Acid-insoluble ash, not more than 5 per cent.

Action and Uses.—Lupulus has the action of the aromatic bitters. The infusion is employed as a vehicle, especially for bitters and tonics; the tincture is stomachic, and is used to improve the appetite and digestion. Both preparations were formerly believed to be sedative, and were given in nervousness and hysteria, and at bedtime to induce sleep. Lupulus is also made up into pillows, on the supposition that it induces sleep; any such action must be attributed to suggestion rather than to any effect of the volatile principles. Preparations of lupulus are **incompatible** with mineral acids and metallic salts.

Preparations

Extractum Lupuli, B.P.C.—(Ext. Lupul.)—Extract of Lupulus. *Syn.*—Extract of Hops. A soft extract. Dose.– 0·3 to 1 gramme (5 to 15 grains).

Infusum Lupuli Concentratum, B.P.C.—(Inf. Lupul. Conc.)—Concentrated Infusion of Lupulus. *Syn.*—Concentrated Infusion of Hops. About 1 in 2½. When infusion of lupulus or Infusum Lupuli is prescribed, this concentrated infusion diluted with seven times its volume of distilled water may be dispensed. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Tinctura Lupuli, B.P.C.—(Tinct. Lupul.)—Tincture of Lupulus. *Syn.*—Tincture of Hops. 1 in 5. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LYCOPODIUM

(Lycopod.)

Lycopodium

Lycopodium consists of the spores of the common club moss, *Lycopodium clavatum* Linn. (Fam. Lycopodiaceæ), a creeping plant

indigenous to Europe, Asia and North America. It is collected chiefly in Russia, during July and August, by beating and shaking the plants and sifting the powder thus obtained. It should be **stored** in well-closed containers to prevent the development of mould.

Lycopodium is a pale yellow, very mobile powder, having a density of about 1·06 to 1·09, but which, because of the peculiar structure of its surface, floats upon water without becoming wet. When blown into a flame, it burns with a brilliant flash, but in a crucible it burns slowly. When rubbed between the fingers it is characteristically smooth and devoid of grittiness. 1 milligram of the powder consists of about 94,000 spores. Examined **microscopically,** the spores are seen to be very uniform in shape and size, the maximum width varying from 21 to 30 microns, being most commonly about 25 microns. Each spore has the shape of a triangular pyramid with a convex base, and is, in fact, the fourth part of a sphere which has been divided by plane surfaces radiating from its centre. The convex surface is covered with a fine network of raised ridges, the meshes being four to six-sided; the three flat, triangular faces have a similar network near the bases, but are nearly smooth towards the apex of the spore; strong ridges mark the lines of union of the flat faces. When crushed, the ruptured spores yield small drops of fixed oil, which stains red with tincture of alkanna.

Lycopodium **contains** about 50 per cent. of fixed oil, which consists chiefly of lycopodium-oleic acid with a little glyceryl myristate. The oil can be obtained by triturating the lycopodium with fine sand or pumice stone, and extracting with ether. Other constituents are sugar, traces of alkaloidal matter, and a phytosterol.

Substitutes and Adulterants.—Starch, pine pollen, resin, mineral matter and other substances have been used to adulterate lycopodium. Pine pollen, collected in Hungary, is known as Lycopodium Hungaricum.

Standard.—Lycopodium yields not more than 3 per cent. of ash. Moisture, not more than 5 per cent.

Action and Uses.—Lycopodium is employed in dispensing as a covering for pills. It does not absorb moisture, and affords some protection to pills composed of hygroscopic substances. It is used as a dusting powder for the skin, to soothe inflamed surfaces and reduce friction. On account of its lightness, it is a convenient diluent for insufflations for the throat, nose and ear; it is also employed as the basis for medicated snuffs. Tincture of lycopodium has been prescribed for incontinence of urine, and to allay spasm and irritation of the bladder. Lycopodium is used in quantitative microscopy.

Preparation

Tinctura Lycopodii, B.P.C.—(Tinct. Lycopod.)—Tincture of Lycopodium, 1 in 10. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

MAGENTA
(Magent.)
Magenta

Synonyms—Fuchsine; Basic Fuchsine; Rosaniline Hydrochloride.

Magenta (Colour Index No. 677) is a mixture of pararosaniline (Colour Index No. 676) (hydrochloride of triaminotriphenylcarbinol anhydride) and rosaniline (hydrochloride of triaminodiphenyltolylcarbinol anhydride), and may be prepared by heating a mixture of aniline, *o*-toluidine and *p*-toluidine and their hydrochlorides with nitrobenzene, or a mixture of nitrobenzene and *o*-nitrotoluene in the presence of iron or zinc chloride. It occurs in glistening, iridescent, green crystals. The aqueous solution becomes yellow on the addition of hydrochloric acid, and a reddish precipitate of rosaniline bases separates on the addition of ammonia or milk of lime. The aqueous solution is decolourised on agitation with ammonia solution and zinc dust.

Soluble in water and alcohol, forming deep red solutions; more soluble in amyl alcohol; insoluble in ether.

Standard.—Magenta leaves not more than 5 per cent. of sulphated ash. Arsenic limit, 10 parts per million. Lead limit, 50 parts per million. Dissolve the sulphated ash from 1 gramme in 20 millilitres of water and 2 millilitres of dilute hydrochloric acid, and add 1 millilitre of potassium ferrocyanide solution; no precipitate is formed (limit of zinc).

Action and Uses.—Magenta is used chiefly in the form of carbol-fuchsin, as a reagent in microscopy for the detection of *B. tuberculosis*. It is also employed as a colouring agent, and a 1 per cent. ointment has been used in the treatment of impetigo.

ACID FUCHSINE (Colour Index No. 692) is a mixture of the sodium or ammonium salts of the di- and trisulphonic acids of magenta. It is soluble in water and alcohol.

MAGNESII BOROCITRAS
(Mag. Borocit.)
Magnesium Borocitrate

Magnesium borocitrate may be prepared by stirring a mixture of magnesium oxide, 3 parts, powdered boric acid, 3 parts, and powdered citric acid, 10 parts, with distilled water, 4 parts, to form a pasty mass. This hardens in a short time, and may be powdered; or it may be spread on glass plates and scaled. Magnesium borocitrate occurs as a white powder or in colourless, shining scales, having a bitterish taste and a weak acid reaction.

Slowly and completely **soluble** in water, more quickly soluble on heating. A small quantity of water converts it into a turbid liquid, but with a larger quantity it dissolves to form a clear solution.

Action and Uses.—Magnesium borocitrate is employed as a urinary antiseptic in chronic cystitis. It is **administered** in mixture form or in cachets. Pulvis Magnesii Borocitratis Compositus is more palatable, and is similarly employed. A mixture of magnesium borocitrate, 1 part, and sucrose, 2 parts, is known as borocite.

Dose.– 1 to 2 grammes ($\frac{1}{4}$ to $\frac{1}{2}$ drachm).

Preparation

Pulvis Magnesii Borocitratis Compositus, B.P.C.—(Pulv. Mag. Borocit. Co.)—Compound Magnesium Borocitrate Powder. Magnesium borocitrate, 1 in 3, with sucrose. Dose.– 2 to 4 grammes ($\frac{1}{2}$ to 1 drachm).

MAGNESII CARBONAS LEVIS

(Mag. Carb. Lev.)

Light Magnesium Carbonate

Light magnesium carbonate is a hydrated, basic magnesium carbonate of variable composition, but corresponding approximately with the formula, $3MgCO_3,Mg(OH)_2,3H_2O$. It may be prepared by the following process:—Dissolve 125 parts of magnesium sulphate in 1000 parts of cold distilled water; add a cold solution of 150 parts of sodium carbonate in 1000 parts of distilled water and boil for fifteen minutes; collect the precipitate, wash with boiling water until the washings are free from sulphate, and dry at a temperature not exceeding 100°. Light magnesium carbonate occurs as a very light, white, stable powder, which is odourless and almost tasteless.

Almost **insoluble** in water and alcohol (90 per cent.).

Standard, B.P.—Light magnesium carbonate leaves on ignition not less than 42 per cent. and not more than 45 per cent. of residue. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for soluble matter, copper, calcium, chloride, sulphate and iron.

Action and Uses.—Light magnesium carbonate is antacid and laxative, resembling light magnesium oxide in its action. It is, however, less effective than the oxide, and has the disadvantage of liberating carbon dioxide. The light variety of magnesium carbonate is more suitable as an antacid and, for this reason, when magnesium carbonate is prescribed in mixtures, the light carbonate should be used, but when prescribed in powders or cachets, the heavy carbonate is more convenient. Light magnesium carbonate may be **administered** in powder form or in suspension in milk or water. It is often given with magnesium sulphate in the form of Mistura Alba, and is employed for subdividing volatile oils in inhalations, but should not be used with compound tincture of benzoin.

Dose.– 0·6 to 4 grammes (10 to 60 grains).

MAGNESII CARBONAS PONDEROSUS

(Mag. Carb. Pond.)

Heavy Magnesium Carbonate

Heavy magnesium carbonate is a hydrated, basic magnesium carbonate of variable composition, but corresponding approximately with the formula, $3MgCO_3,Mg(OH)_2,4H_2O$. It may be prepared by the following process:—Dissolve 125 parts of magnesium sulphate in 250 parts of boiling distilled water; add a solution of 150 parts of sodium carbonate in 250 parts of boiling distilled water. Evaporate the mixed liquids to dryness, and digest the residue for thirty minutes with 500 parts of boiling distilled water; collect the precipitate, wash with boiling distilled water until the washings are free from sulphate, and dry at a temperature not exceeding 100°. Heavy magnesium carbonate occurs as a white, granular powder which is odourless and almost tasteless.

Almost **insoluble** in water and alcohol (90 per cent.).

Standard, B.P.—Heavy magnesium carbonate leaves on ignition not less than 42 per cent. and not more than 45 per cent. of residue. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for soluble matter, copper, calcium, chloride, sulphate and iron.

Action and Uses.—The medicinal properties of heavy magnesium carbonate closely resemble those of the light variety, but its smaller bulk renders it more convenient in use. It is **administered** in mixtures, cachets or powders. In the treatment of hyperchlorhydria, mixtures of calcium carbonate, sodium bicarbonate, bismuth carbonate and magnesium carbonate are used. The proportions of calcium and magnesium carbonate can be so adjusted that neither a purgative nor a constipating effect is produced. Liquor Magnesii Bicarbonatis is a mild laxative and antacid suitable for children; the slight bitterness of the liquid may be masked by the addition of sugar, or an acid syrup, effervescence occurring in the latter case.

Dose.– 0·6 to 4 grammes (10 to 60 grains).

Preparations

Liquor Magnesii Bicarbonatis, B.P.—(Liq Mag. Bicarb.)—Solution of Magnesium Bicarbonate. *Syn.*—Fluid Magnesia. It contains not less than 2·5 per cent. w/v of $Mg(HCO_3)_2$. 60 millilitres contains the equivalent of about 1 gramme, and 2 fluid ounces about 15 grains, of magnesium carbonate. Arsenic limit, 0·2 part per million. Lead limit, 0 5 part per million. It complies also with limit tests for alkali, chloride and sulphate. It should be stored in well-closed containers in a cool place. Dose.– 30 to 60 millilitres (1 to 2 fluid ounces).

Liquor Magnesii Citratis, B.P.C.—(Liq. Mag. Cit.)—Solution of Magnesium Citrate. *Syn.*—Limonade Purgative; Effervescing Solution of Magnesium and Potassium Citrates. A solution containing carbon dioxide and magnesium citrate prepared with citric acid and 4 per cent. w/v of magnesium carbonate, flavoured with syrup of lemon. Dose.– 100 to 300 millilitres (3½ to 10 fluid ounces), or more.

Pulvis Bismuthi Compositus, B.P.C.—(Pulv. Bism. Co.)—Compound Bismuth Powder Bismuth carbonate, 1 part; calcium carbonate, 3 parts; heavy magnesium carbonate, 3 parts; sodium bicarbonate, 1 part. Dose.—1 to 4 grammes (¼ to 1 drachm).

Trochisci Alkalini Compositi, B.P.C.—(Troch. Alk. Co.)—Compound Alkaline Lozenges. Each lozenge contains 12 grains of compound bismuth powder.

MAGNESII CHLORIDUM

(Mag. Chlorid.)

Magnesium Chloride

$MgCl_2,6H_2O = 203{\cdot}3$

Magnesium chloride may be prepared by neutralising hydrochloric acid with magnesium oxide or carbonate and crystallising. It occurs in colourless, transparent, deliquescent crystals. When heated in air, water is evolved, and at the same time partial decomposition occurs with evolution of hydrochloric acid and formation of oxychloride. The anhydrous salt, $MgCl_2$, may be obtained by heating magnesium ammonium chloride.

Soluble in water (about 2 in 1) and alcohol (1 in 6).

Standard.—Magnesium chloride yields a clear solution when 2 grammes is dissolved in 10 millilitres of alcohol (85 per cent.). Arsenic limit, 2 parts per million. Lead limit, 5 parts per million. 1 gramme complies with the limit test for sulphates. 1 gramme in 25 millilitres of 20 per cent. sulphuric acid yields, on the addition of 50 millilitres of alcohol (95 per cent.) and allowing to stand overnight, not more than 0·04 gramme of $CaSO_4$ (limit of calcium).

Action and Uses.—Magnesium chloride has been used as a mild purgative in constipation and in intestinal dyspepsia.

Dose.—8 to 30 grammes (¼ to 1 ounce).

MAGNESII BROMIDUM.—Magnesium bromide, $MgBr_2,6H_2O$, is a colourless crystalline compound, soluble in water. It has an action similar to that of potassium bromide. Dose.—0·3 to 1·2 grammes (5 to 20 grains).

MAGNESII GLYCEROPHOSPHAS

(Mag. Glycerophosph.)

Magnesium Glycerophosphate

$C_3H_7O_6PMg,2H_2O = 230{\cdot}4$

Synonym—Magnesium Glycerylphosphate.

Magnesium glycerophosphate, $MgC_3H_5(OH)_2PO_4,2H_2O$, may be

prepared by neutralising glycerophosphoric acid with magnesium carbonate. It occurs as a white, amorphous powder. Magnesium glycerophosphate is sometimes sophisticated by the addition of citric acid in order to render it more soluble. It is almost entirely **soluble** in cold water (about 1 in 50).

Standard.—Magnesium glycerophosphate contains not less than 97 per cent. of $C_3H_7O_6PMg$, calculated on the substance dried at 130°. Loss on drying at 130°, not more than 16 per cent. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. Dissolve 0·5 gramme in 10 millilitres of water acidified with sulphuric acid, add 2 millilitres of mercuric sulphate solution, boil and, if necessary, filter while hot; the hot filtrate, on the addition of potassium permanganate solution drop by drop, does not produce a white precipitate (limit of citrate). 1 gramme dissolves almost entirely in 50 millilitres of water, leaving not more than a slight residue, which completely dissolves on the addition of 0·2 millilitre of glycerophosphoric acid. When shaken with 25 parts of dehydrated alcohol and filtered, it yields on evaporation of the alcohol, and subsequent drying at 70° for one hour, not more than 1 per cent. of residue (limit of glycerin, etc.). A weight equivalent to 1 gramme of the substance dried at 130°, dissolved in 100 millilitres of water, requires for neutralisation to phenolphthalein not more than 2 millilitres of N/10 hydrochloric acid or of N/10 sodium hydroxide (limit of alkalinity or acidity). The neutralised solution requires not less than 9·8 millilitres of N/2 hydrochloric acid for neutralisation to methyl orange (minimum limit for glycerophosphate).

Assay.—Ignite about 0·5 gramme, accurately weighed, and weigh the residue; 1 gramme of the residue is equivalent to 1·746 gramme of $C_3H_7O_6PMg$.

Action and Uses.—Magnesium glycerophosphate has the general properties of the glycerophosphates (see Acidum Glycerophosphoricum), and is used for its glycerophosphate content rather than for the small proportion of magnesium present. It may be **administered** in solution in water flavoured with syrup of orange or orange-flower water. The salt is **incompatible** with alkali carbonates.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

MAGNESII HYDROXIDUM

(Mag. Hydrox.)

Magnesium Hydroxide

$Mg(OH)_2 = 58·34$

Synonym—Magnesium Hydrate.

Magnesium hydroxide may be prepared by boiling light magnesium oxide with from 20 to 30 times its weight of water for about twenty

minutes, draining and drying in thin layers at a temperature not exceeding 100°. It occurs as a white, amorphous powder, which differs from calcined magnesia by the greater readiness with which it dissolves in dilute acids.

Insoluble in water.

Standard.—Magnesium hydroxide yields on ignition not less than 67 per cent. and not more than 70 per cent. of residue. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies with the limit tests for soluble matter, copper, calcium, chloride, sulphate and iron in Magnesii Carbonas Levis, the quantity taken for each test being three-fifths of the respective quantities of Magnesii Carbonas Levis.

Action and Uses.—Magnesium hydroxide is used as an antacid in gastric acidity and flatulence, in place of the alkali bicarbonates. It neutralises acidity with greater readiness than the oxides of magnesia, and has the advantage over carbonates that carbon dioxide is not evolved, and hence it does not cause an increased secretion of hydrochloric acid. It may be **administered** in tablets, powders or cachets, and may be suitably combined with powdered charcoal and carminatives. Mistura Magnesii Hydroxidi is usually the form in which the hydroxide is given. This preparation is also employed as a mouth-wash to neutralise the acids arising from fermentation around the teeth, the teeth and gums being brushed with the undiluted liquid at bedtime; it also serves as a useful antidote in cases of poisoning by mineral acids or arsenic.

Dose.– 0·6 to 4 grammes (10 to 60 grains).

Preparations

Emulsio Paraffini Liquidi Alkalina, B.P.C.—(Emuls. Paraff. Liq. Alk.)—Alkaline Emulsion of Liquid Paraffin. Mixture of magnesium hydroxide, 25 per cent. v/v, with emulsion of liquid paraffin with agar. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Mistura Bismuthi et Magnesii Hydroxidum, B.P.C.—(Mist. Bism. et Mag. Hydrox.)—Mixture of Bismuth and Magnesium Hydroxides. Equal parts of mixture of bismuth hydroxide and mixture of magnesium hydroxide. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Mistura Magnesii Hydroxidi, B.P.—(Mist. Mag. Hydrox.)—Mixture of Magnesium Hydroxide. *Syn.*—Cream of Magnesia. An aqueous suspension of hydrated magnesium oxide, containing the equivalent of 8·25 per cent. w/v of $Mg(OH)_2$ (limits, 7·75 to 8·75). 16 millilitres contains the equivalent of 0·9 gramme, and 4 fluid drachms the equivalent of about 12½ grains, of magnesium oxide. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

This mixture was included in the British Pharmaceutical Codex, 1923.

Mistura Magnesii Hydroxidi et Paraffini Liquidi, B.P.C.—(Mist. Mag. Hydrox. et Paraff. Liq.)—Mixture of Magnesium Hydroxide and Liquid Paraffin. Liquid paraffin, 30 per cent. v/v, and mixture of magnesium hydroxide, flavoured with vanillin. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

MAGNESII OXIDUM LEVE
(Mag. Oxid. Lev.)

Light Magnesium Oxide

$MgO = 40{\cdot}32$

Synonyms—Magnesia Levis; Light Magnesia.

Light magnesium oxide may be prepared by heating light magnesium carbonate to dull redness. It occurs as a very light, white, odourless powder, with a slightly alkaline taste. On exposure to the air it rapidly absorbs moisture and carbon dioxide. With fifteen times its weight of water it forms a gelatinous mass on standing for about thirty minutes. When heated strongly, it gives out a clear, white light. Light magnesium oxide should be **stored** in well-closed containers.

Almost **insoluble** in water and alcohol (90 per cent.).

Standard, B.P.—Light magnesium oxide loses on ignition not more than 5 per cent. of its weight. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for copper, calcium, chloride, sulphate, iron and soluble matter.

Action and Uses.—Light magnesium oxide is employed as an antacid and laxative, especially for children. It neutralises the acidity of the stomach in dyspepsia and heartburn, allays sickness, especially the vomiting of pregnancy, and renders the secretions less acid in gouty and rheumatic conditions. In the intestine it acts as a mild laxative, but, if repeatedly administered, concretions may be formed in the intestines. The neutralising value of magnesium oxide is more than twice that of magnesium carbonate and about four times that of sodium bicarbonate. Light magnesium oxide may be **administered** in powder form or in suspension in milk or water, but for administration in mixtures containing sodium bicarbonate the carbonates are preferred. The light variety of magnesium oxide is more suitable as an antacid than the heavy variety on account of its greater bulk and, for this reason, when magnesium oxide is prescribed in mixtures, the light oxide should be used, but when prescribed in powders or cachets, the heavy oxide is more convenient. Light magnesium oxide is also used as a dentifrice to neutralise acid secretions and to clean the teeth. It is **incompatible** with acids.

Dose.– 0·6 to 4 grammes (10 to 60 grains).

MAGNESII OXIDUM PONDEROSUM
(Mag. Oxid. Pond.)

Heavy Magnesium Oxide

$MgO = 40{\cdot}32$

Synonyms—Magnesia Ponderosa; Heavy Magnesia.

Heavy magnesium oxide may be prepared by heating heavy magnesium carbonate to dull redness. It occurs as a white, odourless

powder, with a slightly alkaline taste. On exposure to the air, it absorbs moisture and carbon dioxide. It does not form a gelatinous mass when allowed to stand in contact with water. It dissolves in dilute acids, forming solutions of magnesium salts. Heavy magnesium oxide should be **stored** in well-closed containers.

Almost **insoluble** in water and alcohol (90 per cent.).

Standard, B.P.—Heavy magnesium oxide loses on ignition not more than 5 per cent. of its weight. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for soluble matter, copper, calcium, chloride, sulphate and iron.

Action and Uses.– The medicinal properties of heavy magnesium oxide closely resemble those of the light variety, but its smaller bulk renders it more convenient in use. It may be **administered** in mixtures, cachets, or powders.

Dose.– 0·6 to 4 grammes (10 to 60 grains).

MAGNESII PEROXIDUM

(Mag. Perox.)

Magnesium Peroxide

Magnesium peroxide may be prepared by adding solution of hydrogen peroxide to magnesium oxide, and keeping them in contact at the ordinary temperature for a day or two. The mixture is then filtered and the residue washed and dried at 100° to 105°. It occurs as a white, tasteless powder, having an alkaline reaction. It is more stable than hydrogen peroxide at a temperature of 100°; at about 300°, however, it loses all its active oxygen. It gives the reactions of hydrogen peroxide, including the characteristic blue colour on the addition of diluted sulphuric acid and a dichromate. Dilute acids liberate oxygen from magnesium peroxide.

Standard.—Magnesium peroxide contains not less than 15 per cent. of MgO_2. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million

Assay.—Weigh accurately 0·5 gramme into a flask, add 10 millilitres of water and 2·5 grammes of potassium iodide; allow the iodide to dissolve, add 10 millilitres of sulphuric acid (25 per cent.) and allow to stand for ten minutes; titrate the liberated iodine with N/10 sodium thiosulphate; each millilitre of N/10 sodium thiosulphate is equivalent to 0·002816 gramme of MgO_2.

Action and Uses.—Magnesium peroxide is an oxidising agent and disinfectant. It has been employed to arrest gastric and intestinal fermentation. In the treatment of typhoid fever, 10 grain

doses every three or four hours have been found of service. Magnesium peroxide is **administered** in cachets, or the powder may be mixed with water; as an intestinal antiseptic it is best given in glutoid capsules It is a useful antiseptic for the mouth, and may, with advantage, be added to tooth powders. Oxygenated tooth powder (Magnesii Peroxidum cum Creta) may be prepared with 10 per cent. of magnesium peroxide and 2·5 per cent. of hard soap in precipitated chalk suitably flavoured

Dose.– 2 to 4 grammes ($\frac{1}{2}$ to 1 drachm)

MAGNESII PHOSPHAS

(Mag. Phosph.)

Magnesium Phosphate

Synonym—Tribasic Magnesium Phosphate.

Magnesium phosphate is the hydrated, tribasic magnesium phosphate, $Mg_3(PO_4)_2$, containing about 30 per cent. of combined water, and may be prepared by the interaction of magnesium sulphate and trisodium phosphate in aqueous solution. It forms a dry, slightly gritty, white powder, free from musty odour, and loses part of its water when dried at 100°. A less stable product, prepared by crystallisation below 36°, contains up to 60 per cent. of combined water and, unless kept at a low, even temperature, it is liable to develop growths of mould, as a result of evaporation followed by condensation of water.

Insoluble in water.

Standard.—Magnesium phosphate, determined by the residue on ignition, contains not less than 68 per cent. of $Mg_3(PO_4)_2$. Arsenic limit, 5 parts per million. Lead limit, 25 parts per million. 1 gramme with 3 millilitres of nitric acid complies with the limit test for chlorides. 0·25 gramme with 2 millilitres of hydrochloric acid complies with the limit test for sulphates. 1 gramme diffused in 10 millilitres of water dissolves without effervescence on the addition of 5 millilitres of hydrochloric acid (limit of carbonate), and leaves not more than a slight residue

Action and Uses.—Magnesium phosphate has antacid and mildly laxative properties It is said to be superior to magnesium carbonates, hydroxide and oxides, and the alkali carbonates, in that it reduces the excess of acid in the stomach without producing systemic alkalisation. Magnesium phosphate is best **administered** in a little water. It is sometimes given with calcium phosphate to counteract any excessive aperient action produced by giving the magnesium compound alone.

Dose.– 1 to 4 grammes ($\frac{1}{4}$ to 1 drachm).

MAGNESII SALICYLAS
(Mag. Salicyl.)

Magnesium Salicylate

$C_{14}H_{10}O_6Mg,4H_2O = 370{\cdot}5$

Magnesium salicylate, $(C_6H_4OH{\cdot}COO)_2Mg,4H_2O$, may be prepared by neutralising a hot solution of salicylic acid with iron-free magnesium carbonate, filtering and evaporating the solution (in which the acid should be in slight excess) to crystallisation. It occurs in colourless, silky needles, or as a white or slightly pink, crystalline powder, with a sweetish but somewhat bitter taste. Heated to somewhat over 100°, it loses its water of crystallisation.

Readily **soluble** in water and alcohol.

Standard.—Magnesium salicylate, determined by the method of the British Pharmacopœia for Sodii Salicylas, contains not less than 99 per cent. of $C_{14}H_{10}O_6Mg$, calculated on the salt dried at 110°; each millilitre of N/2 sulphuric acid is equivalent to 0·07460 gramme of $C_{14}H_{10}O_6Mg$. Loss on drying at 110°, not less than 19 per cent. and not more than 21 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million.

Action and Uses.—Magnesium salicylate has properties resembling those of the alkali salicylates, and has been used in typhoid fever and to disinfect the alimentary canal, but it is less readily absorbed than the alkali salicylates. It may be given in cachets, or in solution in water. It is **incompatible** with acids and alkali carbonates.

Dose.– 0·5 to 2 grammes (8 to 30 grains).

MAGNESII SULPHAS
(Mag. Sulph.)

Magnesium Sulphate

$MgSO_4,7H_2O = 246{\cdot}5$

Synonym—Epsom Salts.

Magnesium sulphate may be obtained by the action of sulphuric acid on magnesium carbonate, the latter being usually in the form of magnesite, a widely-distributed native basic carbonate. Large quantities are also obtained from the mineral, kieserite, $MgSO_4,H_2O$, which is found in the Stassfurt deposits and is almost insoluble in water, but is gradually converted into the heptahydrate by prolonged contact with water. Magnesium sulphate occurs in colourless, odourless crystals, with a cool, saline, bitter taste and a neutral reaction. It effloresces in warm, dry air, and on heating at 150° to 160° is converted into the monohydrate; the last molecule of water of crystallisation is expelled at about 280°.

Soluble in water (1 in 1·5) and boiling water (20 in 3); almost insoluble in alcohol (90 per cent.).

Standard, B.P.—Magnesium sulphate contains not less than 99·5 per cent. and not more than the equivalent of 102 per cent. of $MgSO_4,7H_2O$. Arsenic limit, 2 parts per million. Lead limit, 5 parts per million. The aqueous solution is neutral to litmus. It complies also with limit tests for zinc, chloride and iron.

Action and Uses.—Magnesium sulphate is a saline purgative. When taken by the mouth, it exerts a hydragogue cathartic action, which is entirely due to the property common to hypertonic non-absorbable solutions of withdrawing fluid by osmosis from the surrounding tissues. The Mg ion is only sparingly absorbed, and the SO_4 ion also is almost entirely excreted by the rectum; magnesium sulphate is therefore one of the most powerful of the saline purgatives, its positive and negative ions both contributing to this result It produces no irritation; the increased peristalsis results from distention due to the presence of an increased quantity of fluid. Nevertheless, injections of magnesium sulphate under the skin, in about 50 per cent. of cases, produce some action on the bowels, probably from the direct irritation of the drug during excretion by the gut. Concentrated solutions are taken in dropsy, and in inflammatory and congestive conditions to remove fluid and reduce blood pressure. In cholecystitis and some cases of catarrhal jaundice, 50 millilitres of a 25 per cent w/v solution administered directly into the duodenum by means of a duodenal tube, or given orally on a fasting stomach, is used to promote evacuation of the gall bladder. In tropical dysentery good results are obtained by giving 4 grammes (1 drachm) of magnesium sulphate with a few minims of dilute sulphuric acid in concentrated solution, every two hours. With ferrous sulphate it is given in anæmia, usually with the addition of dilute sulphuric acid It is the most commonly used domestic saline purgative in chronic constipation, and forms one of the chief ingredients of aperient mineral waters. It is used in baths as a fat-reducing agent, and for the treatment of rheumatism and lumbago.

Magnesium sulphate is a general protoplasmic poison and readily paralyses nerve structures. A 25 per cent. w/v solution of magnesium sulphate, injected into the spinal canal in doses of from 2·5 to 6 millilitres (40 to 90 minims), has given good results in tetanus. It should be employed at as early a stage as possible; in desperate cases, intra-cerebral injections have been used. Such injections have a paralytic action; they relax the muscles and prevent spasm. Intravenously, 10 to 25 millilitres (150 to 375 minims) of a 10 per cent. w/v solution has been found useful to control the convulsions in eclampsia. Magnesium sulphate used with morphine prolongs and intensifies the analgesic action of the latter. Hypodermic injections of 3 millilitres (45 minims) of isotonic solution (7·3 per cent. w/v) have been given in chorea. Applied locally, solutions of magnesium sulphate have an

anæsthetic action; a saturated solution has been used in orchitis, arthritis and other painful inflammations. Carbuncles, boils, etc., are well treated with wet dressings of a 25 per cent. w/v solution; this method has, however, been superseded generally by the use of magnesium sulphate paste (see Magnesii Sulphas Exsiccatus).

Magnesium sulphate is usually **administered** in solution or as Magnesii Sulphas Effervescens; it should be taken well diluted on an empty stomach Mistura Alba is a popular form of administration. Dilute solutions are given in cases of lead poisoning to form the relatively insoluble lead sulphate, but it should be remembered that lead sulphate may produce lead poisoning. Solutions of magnesium sulphate for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. Magnesium sulphate is **incompatible** with alkali carbonates and bicarbonates Strong solutions are incompatible with potassium and ammonium bromides, the double sulphate crystallising out. Cases of **poisoning** by magnesium sulphate have been reported. Hourly doses of mercurous chloride, 0·03 gramme ($\frac{1}{2}$ grain), are recommended, and large intravenous injections of normal saline solution, but the most valuable treatment is the injection of a 5 per cent. solution of a calcium salt which, in sufficient amount, completely counteracts the poisonous action of magnesium.

Dose.– 2 to 16 grammes ($\frac{1}{2}$ to 4 drachms).

Preparations

Magnesii Sulphas Effervescens, B.P.C.—(Mag. Sulph. Efferv.)—Effervescent Magnesium Sulphate. *Syn.*—Effervescent Epsom Salts. About 1 in 2 of the crystalline salt. Dose.– For repeated administration, 4 to 12 grammes (1 to 3 drachms). For a single administration 16 to 30 grammes ($\frac{1}{2}$ to 1 ounce).

Effervescent magnesium sulphate, prepared from an equivalent quantity (500 grammes) of crystalline magnesium sulphate, was included in the British Pharmacopœia, 1914.

Mistura Alba, B.P.C.—(Mist Alb.)—White Mixture. Each fluid ounce contains 120 grains of magnesium sulphate and 20 grains of light magnesium carbonate, in peppermint water Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

Mistura Sennæ Composita, B.P.—(Mist. Senn. Co.)—Compound Mixture of Senna. *Syn.*—Black Draught Magnesium sulphate, 25 per cent. w/v, with liquid extract of liquorice, compound tincture of cardamom and aromatic spirit of ammonia, in infusion of senna. Dose.– 30 to 60 millilitres (1 to 2 fluid ounces).

MAGNESII SULPHAS EXSICCATUS

(Mag. Sulph. Exsicc.)

Exsiccated Magnesium Sulphate

Synonym—Dried Epsom Salts.

Exsiccated magnesium sulphate may be prepared by drying magnesium sulphate at 100° until it has lost approximately 25 per cent.

of its weight. It occurs as a white powder It should be **stored** in well-stoppered bottles.

Soluble in water (1 in 2); more rapidly soluble in hot water

Standard.—Exsiccated magnesium sulphate, determined by the method of the British Pharmacopœia for Magnesii Sulphas, contains not less than 62 per cent and not more than 70 per cent of $MgSO_4$, each gramme of the residue is equivalent to 1·081 grammes of $MgSO_4$ Arsenic limit, 5 parts per million. Lead limit, 10 parts per million 7·5 grammes dissolves in 20 millilitres of water, forming a solution which may be slightly turbid at first, but clears in a few minutes (limit of insoluble matter).

Action and Uses.—The medicinal properties of exsiccated magnesium sulphate are virtually those of magnesium sulphate Its uses are, however, confined to certain preparations where it would be disadvantageous to use the ordinary salt. Exsiccated magnesium sulphate is one of the chief ingredients of effervescent and non-effervescent aperient powders or granules. Pasta Magnesii Sulphatis is used extensively as an application for carbuncles, boils, etc. The inflamed area is covered over with the paste spread on lint, jaconet is applied over the lint and, finally, cotton wool over and around the parts, the dressing being renewed until the central slough has separated, leaving a healthy, granulating surface

Dose.– 2 to 12 grammes ($\frac{1}{2}$ to 3 drachms).

Preparations

Pasta Magnesii Sulphatis, B.P.C.—(Past. Mag. Sulph.)—Magnesium Sulphate Paste. *Syn.*—Morison's Paste. Exsiccated magnesium sulphate dried at 100° 45 per cent., and glycerin, with 0 5 per cent. of phenol

Sal Aperiens Sulphuratum, B.P.C.—(Sal. Aper. Sulphur.)—Sulphurated Aperient Salt. *Syn.*—Harrogate Salts Sulphurated potash, 3 per cent., and potassium acid tartrate, 15 per cent., with exsiccated magnesium sulphate. Dose.– 4 to 8 grammes (1 to 2 drachms).

MALTOSUM

(Maltos.)

Maltose

$C_{12}H_{22}O_{11},H_2O = 360·2$

Maltose is the β-maltose obtained from starch by the hydrolytic action of the enzyme diastase. It may be prepared by the action of malt extract on starch paste, and purified from dextrins by mixing the thin syrup obtained after evaporation with alcohol The dextrin is removed by filtration, and the maltose obtained from the filtrate by evaporation and crystallisation. It crystallises from water in plates with one molecule of water, and from alcohol in crusts in the anhydrous

state. It reduces Fehling's solution, and may be distinguished from dextrose by not reducing a solution of copper acetate in 1 per cent. acetic acid, and from lactose by the appearance of its osazone. It is dextrorotatory. On hydrolysis with mineral acids it yields dextrose.

Crystalline β-maltose, having the following properties, is used as a constituent of culture media:—Melting-point, 160° to 165°; specific rotation, in 2 per cent. aqueous solution, + 129·0° to + 129·3°; 1 gramme dissolves in 50 millilitres of alcohol (95 per cent.) without residue (limit of dextrin), and its osazone has a melting-point not lower than 205°.

Soluble in water and alcohol.

Action and Uses.—It is used largely in bacteriological culture media. The use of carbohydrate mixtures containing maltose and dextrins for infant-feeding is described under Lactosum.

MANGANI CHLORIDUM

(Mang. Chlorid.)

Manganese Chloride

$MnCl_2,4H_2O = 197·9$

Manganese chloride may be prepared by dissolving manganese carbonate in hydrochloric acid, filtering the solution, concentrating, and allowing to crystallise. It occurs in the form of tabular crystals or as a granular, very hygroscopic powder, having a pale rose-red colour, and a bitter, sharp, styptic, afterwards saline taste. The diluted aqueous solutions are almost colourless, concentrated solutions pale red, and alcoholic solutions greenish The latter burns with a red flame. The salt loses all its water of crystallisation at 100°. The anhydrous salt dissolves in water, with evolution of heat, melts in the absence of air at a red heat, and sublimes at a higher temperature. Heated in contact with air, it loses hydrochloric acid and yields an oxychloride.

Soluble in water (about 1 in 1) and alcohol; insoluble in ether.

Action and Uses.—Manganese chloride has the general properties of manganese salts, which are said to be more powerful stimulants to antibody formation than salts of other metals. Injected into experimental animals immunised against certain bacterial infections, they are said to increase very considerably the amount of antitoxin in the blood. Manganese salts are used in the treatment of staphylococcal infections, such as boils, furunculosis, etc. Manganese chloride, given by hypodermic injection, has been used in the treatment of pulmonary tuberculosis, in doses of 2·5 to 5 millilitres (40 to 75 minims) of a 0·6 per cent. w/v solution, given at intervals of three to five days. In dementia præcox, successful results have been reported from a course

of 30 twice-weekly injections of a 0·4 per cent. w/v solution, commencing with 2 millilitres (30 minims) and increasing to 8 millilitres (120 minims). This course is followed by oral doses of 0·3 gramme (5 grains) twice daily for one month. Small doses of manganese salts are sometimes given with iron in syrups and pills for the treatment of microcytic anæmia. As a local application, manganese chloride has been used to stimulate syphilitic and other indolent ulcers. Solutions of manganese chloride for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·3 gramme (5 grains); 0·016 to 0·03 gramme ($\frac{1}{4}$ to $\frac{1}{2}$ grain), by injection.

MANGANI BUTYRAS.—Manganese butyrate, $(C_3H_7{\cdot}COO)_2Mn$, is used in 1 per cent. w/v solution as a remedy for furunculosis and for staphylococcal and gonococcal infections. Intramuscular injections of 1 to 2 millilitres (15 to 30 minims) of the solution may be made at intervals of 5 days, with a maximum number of three injections. Solutions of manganese butyrate for injection may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. They should be stored protected from light.

MANGANI SULPHAS.—Manganese sulphate, $MnSO_4,4H_2O$, occurs in colourless or pale rose-coloured crystals, or as a nearly white powder, with a slightly bitter and astringent taste. It is soluble in water (1 in 1·5), the solution being neutral or very slightly acid to litmus, and insoluble in alcohol.

Preparation

Liquor Ferri Peptonatis cum Mangano, B.P.C.—(Liq. Ferr. Pepton. c. Mang.)—Solution of Iron Peptonate with Manganese. *Syn.*—Solution of Peptonised Iron with Manganese. Each fluid drachm contains about $\frac{1}{5}$ grain of manganese chloride with solution of iron peptonate. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

MANGANI DIOXIDUM PRÆCIPITATUM

(Mang. Diox. Præcip.)

Precipitated Manganese Dioxide

$MnO_2 = 86{\cdot}93$

Synonym—Mangani Peroxidum Præcipitatum.

Precipitated manganese dioxide consists chiefly of manganese dioxide, with small amounts of other oxides of manganese. It may be prepared by dissolving 5 parts of manganese sulphate in 100 parts of distilled water, diluting 25 parts of solution of ammonia and 25 parts of solution of hydrogen peroxide, each with an equal volume of distilled water, mixing, pouring the mixed solutions slowly, with constant stirring, into the solution of manganese sulphate, and allowing to stand for one hour, stirring frequently. The precipitate is washed and dried. It occurs as a very fine, heavy, odourless, tasteless, black powder, free from grittiness. Manganese dioxide is found in nature chiefly

in the form of pyrolusite, as steel-grey, prismatic crystals, having a specific gravity of 4·9, and also in the amorphous form, psilomelane, in which form it contains more or less iron oxide, calcium carbonate and earthy matter.

Insoluble in water and alcohol; soluble in hot mineral acids, entirely soluble in cold hydrochloric acid.

Standard.—Precipitated manganese dioxide contains not less than 80 per cent. of MnO_2. 1 gramme, digested with a mixture of 2 grammes of oxalic acid, 20 millilitres of distilled water and 3 millilitres of sulphuric acid for several hours on a water-bath, leaves not more than 0·2 per cent. of insoluble residue (limit of insoluble substances).

Assay.—Heat about 0·15 gramme, accurately weighed, with 50 millilitres of N/10 oxalic acid and 3 millilitres of sulphuric acid to 80°, and titrate with N/10 potassium permanganate; each millilitre of N/10 oxalic acid is equivalent to 0·004347 gramme of MnO_2.

Action and Uses.—Precipitated manganese dioxide has been used in conjunction with iron salts in the treatment of anæmia. It may be **administered** in cachets or in pills.

Dose.—0·12 to 0·5 gramme (2 to 8 grains)

MANGANI GLYCEROPHOSPHAS

(Mang. Glycerophosph.)

Manganese Glycerophosphate

$C_3H_7O_6PMn = 225·0$

Synonym—Manganese Glycerylphosphate

Manganese glycerophosphate, $MnC_3H_5(OH)_2PO_4$, may be prepared by neutralising glycerophosphoric acid with manganese carbonate. It occurs as a pale pink, amorphous powder.

Soluble in water

Standard.—Manganese glycerophosphate contains not less than 97 per cent. of $C_3H_7O_6PMn$, calculated on the substance dried at 130°. Loss on drying at 130°, not more than 5 per cent. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. 0·25 gramme complies with the limit test for iron. Dissolve 0·5 gramme in 10 millilitres of water acidified with sulphuric acid, add 2 millilitres of mercuric sulphate solution, boil and, if necessary, filter while hot; the hot filtrate, on the addition of potassium permanganate solution drop by drop, does not produce a white precipitate (limit of citrate). When shaken with 25 parts of dehydrated alcohol and filtered, it yields on evaporation of the alcohol, and subsequent drying at 70° for one hour, not more than 1 per cent. of residue (limit of glycerin, etc.). A weight of the substance equivalent to 1 gramme dried at 130°, dissolved in 100 millilitres of water, requires for neutralisation to phenolphthalein

not more than 2 millilitres of N/10 hydrochloric acid or of N/10 sodium hydroxide (limit of alkalinity or acidity). The neutralised solution requires not less than 8·0 millilitres of N/2 hydrochloric acid for neutralisation to methyl orange (minimum limit of glycerophosphate). 1 gramme dissolves in 100 millilitres of water, with only a slight turbidity.

Assay.—Ignite about 0·5 gramme, accurately weighed, and weigh the residue; 1 gramme of the residue is equivalent to 1·585 grammes of $C_3H_7O_6PMn$.

Action and Uses.—Manganese glycerophosphate has the general properties of manganese salts and the glycerophosphates Like other manganese salts, it is sometimes used as a hæmatinic in conjunction with salts of iron. It may be **administered** in pills, tablets, or cachets

Dose.—0·06 to 0·3 gramme (1 to 5 grains).

MANGANI HYPOPHOSPHIS

(Mang. Hypophosph.)

Manganese Hypophosphite

$Mn(H_2PO_2)_2,H_2O = 203·0$

Manganese hypophosphite may be prepared by dissolving manganese carbonate in the equivalent quantity of hypophosphorous acid and crystallising from the hot aqueous solution, or by boiling a solution of barium hypophosphite with a solution of manganese sulphate, filtering, and evaporating or allowing to crystallise Manganese hypophosphite occurs in white or slightly rose-coloured, odourless, nearly tasteless crystals, or as a granular powder The aqueous solution is acid to litmus. On heating, the salt swells, evolves spontaneously inflammable hydrogen phosphide, and leaves a residue of manganese pyrophosphate. It is readily oxidised by nitric acid, and reduces acidified mercuric chloride solution to metallic mercury

Soluble in water (1 in 7) and boiling water (1 in 6); almost insoluble in alcohol

Standard.—Manganese hypophosphite, determined by the method for Calcii Hypophosphis, contains not less than 97 per cent of $Mn(H_2PO_2)_2,H_2O$; each millilitre of N/10 iodine is equivalent to 0·005075 gramme of $Mn(H_2PO_2)_2,H_2O$ Arsenic limit, 10 parts per million. Lead limit, 50 parts per million 1 gramme, dissolved in 20 millilitres of water and filtered, remains clear on the addition of an equal volume of calcium sulphate solution (limit of barium)

Action and Uses.—Manganese hypophosphite has the general properties of manganese salts and the hypophosphites Like other

manganese salts, it is sometimes used as a hæmatinic in conjunction with salts of iron. It may be **administered** in pills, tablets, or cachets, or in compound syrups and other preparations. Syrupus Hypophosphitum Compositus contains in 8 millilitres (2 fluid drachms) 0·037 gramme ($\frac{1}{2}$ grain) of manganese hypophosphite.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

MANNA
(Manna)

Manna

Manna is the dried, saccharine juice exuded from the stems of *Fraxinus Ornus* Linn. (Fam. Oleaceæ), a small tree indigenous to the Eastern Mediterranean, and cultivated in Sicily. When the trees are about ten years old, during July and August a vertical series of oblique incisions is made in the bark to the depth of the cambium; a juice slowly exudes from the wounds, and either dries on the stem (flake manna), or, in wet seasons, drops from the stems and is caught upon tiles, or the flattened cladodes of cactus, yielding a quality inferior to the flake manna.

Flake manna occurs in yellowish-white, brittle, stalactitic masses, about 10 to 15 centimetres long and 2 to 2·5 centimetres wide, which are more or less triangular in section, smooth and slightly concave on the side which was adherent to the tree; the structure is indistinctly crystalline. The odour is slight and agreeable, and the taste is sweet. The inferior qualities consist of fragments agglutinated together, often darker in colour. The cold-water extract does not undergo vinous fermentation with yeast.

Manna **contains** the hexahydric alcohol, mannitol, of which it may contain from about 40 to 60 per cent. Other constituents are mannotetrose (stachyose, about 12 to 16 per cent.), mannotriose (about 6 to 16 per cent.), dextrose, mucilage, water (about 10 per cent.) and traces of a fluorescent substance (fraxin). Mannitol can be isolated from manna by extraction with hot alcohol, cooling, and recrystallising the crystals that separate; it is soluble in about 6·5 parts of water, easily soluble in hot alcohol, sparingly in cold. Mannotetrose is dextrorotatory, and each molecule yields on hydrolysis two molecules of galactose and one each of dextrose and lævulose; each molecule of mannotriose yields two molecules of galactose and one of dextrose.

Action and Uses.—Manna is used as a gentle laxative for infants and children. It is sometimes administered in the form of syrup (Syrupus Mannæ, 1 in 10; dose, 1 to 4 fluid drachms), and as a compound syrup containing manna, senna and fennel.

Dose.– 2 to 16 grammes ($\frac{1}{2}$ to 4 drachms).

MARANTA
(Marant.)
Arrowroot

Arrowroot is the starch prepared from the rhizomes of *Maranta arundinacea* Linn. (Fam. Marantaceæ), a native of Central America, but cultivated in the West Indies, Natal and other tropical and sub-tropical countries.

Arrowroot is a white powder, much of which adheres to form small, irregular masses up to about 5 millimetres in maximum length, and crepitates slightly when pressed. It is tasteless and odourless.

The diagnostic **microscopical** characters of arrowroot are the ovoid to ellipsoid shape of the granules, which frequently show small, local enlargements or tuberosities; the well-marked hilum, generally situated near the broader end of the granules, and frequently taking the form of a two-rayed cleft, which resembles the appearance of the wings of a bird in flight; the clearly marked, but very fine, concentric striations. The granules are simple, and vary in size from about 7 to 75 microns in their greatest dimension, being most commonly from 30 to 50 microns; they exhibit a well-marked cross by polarised light, and show brilliant colours with a selenite plate.

Arrowroot **contains** about 14 to 17 per cent. of moisture, the remainder of the granule consisting of 66 per cent. of polymerised amylose and 33 per cent. of amylopectin.

Varieties.—Several varieties of arrowroot are found in commerce and bear the names of their places of origin, e.g., Bermuda, St. Vincent, Natal, West Indian, etc.; the most highly valued variety is that from Bermuda. These varieties differ slightly in gelatinising properties.

Substitutes.—Many starches have been described as arrowroots and are sometimes substituted for arrowroot; the most important of these substitutes are the starches of potato, *Solanum tuberosum* Linn., sometimes known as English arrowroot, the sweet potato, *Ipomœa Batatas* Poir., sometimes known as Brazilian arrowroot, and various species of *Curcuma*, such as *C. angustifolia* Roxb. and *C. leucorhiza* Roxb., known as East Indian arrowroot. Potato starch is distinguished by the larger size, up to 100 or 150 microns, of many of its granules, which are sometimes compound, with 2 to 3 components, and have coarser striations, while the hilum has the form of a point situated usually at the narrower end of the ovoid granule. The granules of sweet potato starch are rounded, polyhedral or muller-shaped, many compound grains are present with 2 or 3 or sometimes up to 6 components; the individual granules are somewhat smaller than those of arrowroot, attaining a maximum of about 55 microns; the hilum is usually fissured or stellate and may be central or $\frac{1}{2}$ to $\frac{1}{5}$ eccentric. The granules of curcuma starch are typically scitaminaceous, about 30 to 60 or up to 140 microns long, 25 to 35 microns wide and 7 to 8 microns thick. The starch of *Manihot utilissima* Pohl is known as Brazilian, Bahia, Rio or Pará arrowroot. The granules are mostly compound, with 2 or 3 or up to 8 components which usually separate in the commercial starch. The simple granules are mostly sub-spherical and the components of compound grains are usually muller-shaped; the simple grains and smaller components measure 5 to 15 or 25 microns and the larger components 25 to 35 microns.

Standard.—Arrowroot loses, on drying at 100°, not more than 20 per cent. of its weight. Ash, not more than 0·3 per cent.

Action and Uses.—Arrowroot has the general properties of starch. It is used as a gruel in the treatment of diarrhœa. As a suspending agent it is used for preparing barium meals, and it is sometimes preferred for use in tablet-making, since it permits more rapid disintegration.

MARRUBIUM
(Marrub.)

Horehound

Synonyms—Hoarhound; White Horehound.

Horehound consists of the dried leaves and flowering tops of *Marrubium vulgare* Linn. (Fam. Labiatæ), an erect, herbaceous plant indigenous to Britain, and widely distributed over Europe.

The stem is quadrangular and branching; the leaves are cordate-ovate, shortly stalked and crenate, reticulate on both sides, and about 3 to 5 centimetres long. The stem and under surface of the leaves are covered with soft, woolly, whitish hairs. The flowers are small and white, in axillary verticillasters. The calyx has ten veins and ten teeth ending in rigid, hooked and recurved points; the corolla is bilabiate, the upper lip being small, erect and bilobed, and the lower lip trilobed. The drug has an agreeable odour, and a somewhat aromatic, bitter taste.

Horehound **contains** a crystalline bitter lactone, marrubiin, together with a little volatile oil and tannin. When infused with hot water for fifteen minutes, it yields about 20 per cent. of extractive. Marrubiin crystallises in colourless plates or needles, melting at about 160°; it is almost insoluble in water, but soluble in alcohol and ether.

Standard.—Horehound contains not more than 1 per cent. of foreign organic matter. Acid-insoluble ash, not more than 2 per cent.

Horehound, in powder (Pulvis Marrubii : Pulv. Marrub.), contains the constituents of Marrubium, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Horehound is expectorant and, in large doses, laxative. In the form of infusion, oxymel or syrup, it is a popular domestic remedy for coughs, colds and pulmonary affections.

Dose.– 1 to 2 grammes (¼ to ½ drachm).

Preparations

Infusum Marrubii Concentratum, B.P.C.—(Inf. Marrub. Conc.)—Concentrated Infusion of Horehound. About 1 in 2½. When infusion of horehound or Infusum Marrubii is prescribed, this concentrated infusion diluted with seven times its volume of distilled water may be dispensed. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Syrupus Marrubii, B.P.C.—(Syr. Marrub.)—Syrup of Horehound. About 1 in 2. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

MASTICHE
(Mastich.)

Mastic

Mastic is a resinous exudation from *Pistacia Lentiscus* Linn. (Fam. Anacardiaceæ), a small tree indigenous to the Mediterranean countries. It is collected on the island of Chios (Scio) in the Ægean Sea, by puncturing the bark of the trees and allowing the oleo-resin, which is contained in schizogenous ducts in the bast, to exude and harden.

Mastic occurs in small, hard, globular or pyriform pieces, about 4 to 8 millimetres in diameter, or more rarely in ovoid or nearly cylindrical pieces up to 2 centimetres long and 1 centimetre wide. When fresh, the tears are pale yellow in colour, clear and glassy, but, on keeping, the surface becomes dull and dusty; they are brittle, and break with a conchoidal fracture. The acid number of mastic varies from about 50 to 67; specific gravity, 1·074; melting-point, about 106°. It is insoluble in water, partially soluble in alcohol or oil of turpentine, very soluble in chloroform (2 in 1), and in ether (2 in 1). The drug has a somewhat aromatic odour and agreeable taste, and breaks up, when chewed, into sandy fragments which agglomerate into a plastic mass.

Mastic **contains** resin, which is associated with about 2 per cent. of volatile oil. The resin has been separated into the following constituents: α- and β-masticinic acids (together forming about 4 per cent. of the drug), masticolic acid, α- and β-masticonic acids (about 38 per cent.), α-masticoresene (soluble in alcohol, about 30 per cent.), β-masticoresene (also called masticin, insoluble in alcohol, about 20 per cent.). The volatile oil consists chiefly of *d*-pinene.

Substitute.—East Indian or Bombay mastic is obtained from *P Khinjuk* Stocks (and possibly other species); it somewhat resembles genuine mastic, but the tears are darker, less vitreous, and not so clean. It is also more soluble in alcohol, less soluble in oil of turpentine, and less disposed to agglomerate when chewed; the acid number varies from 103 to 109.

Action and Uses.—Mastic is used in Eastern countries as a masticatory to sweeten the breath and preserve the teeth and gums. It was formerly employed internally, as a stimulant to the mucous membranes in place of other terebinthinate resins, but is now rarely used. Solutions of mastic in alcohol, ether, or chloroform are used, applied on cotton wool, as temporary fillings for carious teeth. A surgical varnish containing mastic, 40 parts, castor oil, 1·2 parts, and benzene, to 100 parts, is used as a protective covering for wounds and to hold gauze and radium needles in position.

Dose.– 1 to 3 grammes (¼ to ¾ drachm).

Preparation

Tinctura Ammoniæ Composita, B.P.C.—(Tinct. Ammon. Co.)—Compound Tincture of Ammonia. *Syn.*—Eau de Luce Mastic, 1 in 80, with alcohol (90 per cent.) and oil of lavender, in strong solution of ammonia.

MATICA
(Matic.)
Matico

Synonyms—Matico Leaves; Maticæ Folia.

Matico consists of the dried leaves of *Piper angustifolium* Ruiz et Pav. (Fam. Piperaceæ), a shrub indigenous to Bolivia, Peru, Brazil and Colombia.

The leaves are from about 10 to 20 centimetres long and about 2 to 4 centimetres broad, lanceolate, acuminate, shortly petiolate, greyish or yellowish-green, and brittle; the base is cordate and unequal. The upper surface is tessellated by the depressed veinlets, dividing it into squares about 1 to 2 millimetres wide; the under surface has raised veinlets, the depressions thus formed being clothed with a coarse pubescence. Lateral veins curve rapidly towards the apex, being almost concurrent near the margin, which is entire and revolute. Flowering and fruiting spikes, when present, are slender, and about 10 to 15 centimetres long; the stalks have swollen nodes. The odour is slight and aromatic, and the taste bitter and camphoraceous.

The diagnostic **microscopical** characters are the numerous long, uniseriate covering hairs on both surfaces; the single row of hypodermis on the upper side; the dorsiventral mesophyll; the palisade tissue, usually two cells deep, with numerous large, sub-spherical idioblasts containing oil; the meristele of the midrib, consisting of about 4 to 10 vascular bundles in a crescent-shaped group; the scattered sclerenchymatous cells in the parenchyma of the midrib; the presence of acicular raphides and small prisms of calcium oxalate, and of spherical pollen grains about 25 to 30 microns in diameter.

Matico **contains** 1 to 3·5 per cent. of volatile oil, tannin, a bitter principle, and crystalline artanthic acid.

Substitutes.—The leaves of *Piper aduncum* Linn., often present in commercial matico, are distinguished by their more prominent, ascending, parallel veins, the spaces between which are nearly glabrous. Leaves of other species, such as *P. lineatum* Ruiz et Pav., *P. camphoriferum* C. DC. and *P. acutifolium* var. *subverbascifolium* Ruiz et Pav., yield volatile oils which differ from that of the genuine drug.

Standard.—Matico contains not more than 5 per cent. of the stems, flower spikes and other foreign organic matter. Acid-insoluble ash, not more than 6 per cent.

Action and Uses.—Matico has been employed as a styptic, but is now rarely used in medicine. The infusion (1 in 20) and tincture (1 in 5) have been used internally in mixture form; the latter is the more powerful styptic.

Dose.– 2 to 8 grammes (½ to 2 drachms).

MATRICARIA
(Matric.)
Matricaria

Synonyms—Chamomilla; German Chamomile.

Matricaria consists of the dried flowerheads of *Matricaria Chamomilla* Linn. (Fam. Compositæ), an annual plant indigenous to Northern Europe.

The dried flowerheads are about 6 millimetres in diameter, exclusive of pistillate ray florets, which have usually fallen off; these are about 12 to 20 in number, and are white at first, but darken with age; each ligulate corolla is about 6 millimetres long and 2 millimetres wide, and shows four veins and usually three teeth. The numerous brownish-yellow, tubular, disc florets, which are about 2 millimetres long, are usually firmly attached to a conical, hollow receptacle, which is about 5 millimetres high, bears no paleæ, and is surrounded by an involucre of about two to three rows of small imbricated bracts, having blunt apices and scarious margins. There is no pappus. The drug has a pleasant aromatic odour and a bitter taste.

Matricaria **contains** a blue volatile oil (German chamomile oil), a thick fluid, which is freely soluble in alcohol. It differs somewhat from oil of chamomile, but its exact composition has not been determined. In addition to the volatile oil, matricaria contains salicylic acid, apigenin, a glycoside of apigenin, umbelliferone methyl-ether, choline, triacontane, a phytosterol and a mixture of fatty acids. Matricaria yields to alcohol (60 per cent.) about 20 per cent. of extractive. The ash is about 10 per cent.

Standard.—Matricaria contains not more than 8 per cent. of its stems and other foreign organic matter. Acid-insoluble ash, not more than 4 per cent.

Matricaria, in powder (Pulvis Matricariæ; Pulv. Matric.), contains the constituents of Matricaria, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Matricaria has similar properties to chamomile, and is used for similar purposes.

Dose.—8 to 16 grammes (2 to 4 drachms).

MEDULLA RUBRA
(Medull. Rub.)
Red Bone Marrow

Red bone marrow is the mixed fatty material from the bones of calves and young oxen. The bones from recently killed animals are sawn longitudinally by machine saws, and the marrow is extracted.

It is the highly vascular connective tissue which occupies the spaces in the spongy, or cancellous, tissue. Marrow obtained from calves occurs as a reddish mass containing some fat cells and a large number of amœboid marrow cells, which are the precursors of the leucocytes found in the blood. Amongst the cells, a variable number of erythroblasts, which are the nucleated red cells, are to be found; from these cells the hæmoglobin-containing corpuscles of the blood are developed. The yellow marrow found in the bones of old animals contains no erythroblasts, and is not used in preparations for medical treatment.

Action and Uses.—Red bone marrow has been employed in the treatment of the anæmias, with a view to increasing the hæmoglobin content of the blood by stimulating the red bone marrow, but its use in pernicious anæmia is almost entirely superseded by preparations of liver or hog stomach. It is **administered** in the fresh state, or in the form of Extractum Medullæ Rubræ.

Dose.– 1·3 to 2·6 grammes (20 to 40 grains).

Preparations

Extractum Malti Liquidum et Medullæ Rubræ, B.P.C.—(Ext. Malt. Liq. et Medull. Rub.)—Liquid Extract of Malt and Red Bone Marrow. Liquid extract of malt and extract of red bone marrow, equal parts. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Medullæ Rubræ, B.P.C.—(Ext. Medull. Rub.)—Extract of Red Bone Marrow. *Syn.*—Glycerin Extract of Red Bone Marrow. 1 in 4. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Glycerinum Glycerophosphatum cum Medulla Rubra, B.P.C.—(Glycer. Glycerophosph. c. Medull. Rub.)—Glycerin of Glycerophosphates with Red Bone Marrow. *Syn.*—Elixir Glycerophosphatum cum Medulla Rubra, Elixir of Glycerophosphates with Red Bone Marrow; Glycerol Glycerophosphatis cum Medulla Rubra. Equal parts of extract of red bone marrow and compound glycerin of glycerophosphates. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Syrupus Glycerophosphatum Compositus cum Medulla Rubra, B.P.C.—(Syr. Glycerophosph. Co. c. Medull. Rub.)—Compound Syrup of Glycerophosphates with Red Bone Marrow. Compound syrup of glycerophosphates and extract of red bone marrow, equal parts. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

MEL DEPURATUM

(Mel Depur.)

Purified Honey

Synonyms—Clarified Honey; Mel Despumatum.

Purified honey is prepared by melting honey, allowing it to stand, straining off the impurities which rise to the surface, and adjusting to a specific gravity of 1·36 by the addition of distilled water. Honey is a saccharine secretion deposited in the honeycomb by the bee, *Apis mellifica* Linn. (Order Hymenoptera) and other species, the saccharine

matter being extracted from the nectaries of flowers by the bee, the salivary glands of which contain the enzyme invertase which converts sucrose into invert sugar. Honey occurs as a viscous, translucent, syrupy liquid, or as a soft, opaque, crystalline, semi-solid mass, varying in colour from white to reddish-brown. Purified honey occurs as a thick, syrupy, translucent, pale yellow or yellowish-brown liquid, with a characteristic odour and a sweet, characteristic taste.

Honey **contains** about 70 to 80 per cent. of dextrose and lævulose; other constituents are water, small quantities of sucrose, dextrin, wax, proteins, volatile oil and formic acid, while pollen and flocculent matter are usually also present in suspension, and tend to induce fermentation. The finest grade of honey is that which is allowed to drain from the comb, but most of the honey of commerce is obtained by submitting the honeycomb to pressure, with or without the application of heat, or by means of a centrifuge.

Standard, B.P.—Purified honey has a specific gravity of 1·359 to 1·361. Optical rotation of a 20 per cent. w/v solution, decolourised if necessary, from +0·6° to −2°, corresponding to a specific rotation of +3° to −10° for the original purified honey. Ash, not more than 0·3 per cent. w/w. It complies also with limit tests for chloride and sulphate and a test for absence of artificial invert sugar.

Action and Uses.—Purified honey is used as a demulcent and sweetening agent. It is employed in cough mixtures with expectorants and sedatives, and is a convenient vehicle for the application of borax to the mouth in aphthous conditions.

Dose.– 2 to 8 grammes (½ to 2 drachms).

Preparations

Linctus Acidus, B.P.C.—(Linct. Acid.)—Acid Linctus. Oxymel, 1 in 3, with dilute sulphuric acid, emulsion of chloroform and treacle. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Mel Boracis, B.P.—(Mel. Borac.)—Honey of Borax. *Syn.*—Borax Honey; Borax and Honey. Borax, 10 per cent. w/w, dissolved in glycerin and purified honey.

Oxymel, B.P.—(Oxymel)—Oxymel. Acetic acid and distilled water, of each 15 per cent. v/v, in purified honey. Specific gravity, 1·258 to 1·263. Optical rotation at 20° of a 25 per cent. w/v solution in water, decolourised if necessary with charcoal, +0·6° to −1·9°. It complies also with a test for limits of acidity. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

MENTHA PIPERITA

(Menth. Pip.)

Peppermint

Peppermint consists of the dried leaves and flowering tops of *Mentha piperita* Linn. (Fam. Labiatæ), a plant growing wild throughout

Europe, and cultivated in England, France, Germany, Russia and America. There are two varieties, known respectively as black peppermint and white peppermint.

The stems are quadrangular, and purplish or greenish in colour, with scattered, deflexed hairs and petiolate, ovate-lanceolate, light or dark green leaves, 3 to 8 centimetres long and about half that width, acute and sharply serrate. The small purple flowers occur in terminal, obtuse spikes consisting of closely-arranged verticillasters; each flower has a five-toothed, tubular calyx, a four-lobed campanulate corolla, and four short, equal stamens. The odour is strong and characteristic and the taste pungent and cooling. The drug **contains** volatile oil.

Standard.—Peppermint contains not more than 2 per cent. of foreign organic matter. Acid-insoluble ash, not more than 2 per cent.

Action and Uses.—Peppermint is an aromatic stimulant and carminative, and is used chiefly in the form of its volatile oil.

Dose.– 2 to 4 grammes (½ to 1 drachm).

MENTHA PULEGIUM.—Pulegium, or pennyroyal, consists of the dried leaves and flowering tops of *Mentha Pulegium* Linn., a plant indigenous to Britain and most parts of Europe. The herb is very much branched, and prostrate or erect, with bluntly quadrangular stems. The leaves are petiolate, ovate and from 6 to 20 millimetres long with an entire to crenate margin. The flowers are in distant, axillary, globose verticillasters; the calyx and pedicels are pubescent or hispid. The odour is strong and characteristic, and the taste pungent and mint-like. It contains volatile oil. Pulegium has similar properties to peppermint and is used as an antispasmodic, but it is somewhat more irritant to the genito-urinary tract during excretion, and may thus reflexly augment uterine movements; it is, therefore, also used as an emmenagogue. The volatile oil is chiefly employed. Dose.– 2 to 4 grammes (½ to 1 drachm).

MENTHA VIRIDIS.—Spearmint, or mint, consists of the dried leaves and flowering tops of *Mentha viridis* Linn., a native of Europe and Asia. It is widely cultivated for culinary use and is usually met with in commerce finely rubbed. Spearmint has a square stem and sessile, elliptical-oblong, sharply serrate leaves, about four times as long as they are wide. The flowers are in slender, somewhat cylindrical terminal spikes and the stamens are rather long. The odour is strong and characteristic; the taste is somewhat bitter and pungent. The drug contains volatile oil. Spearmint resembles peppermint in its properties, but its flavour is less agreeable in medicines. Dose.– 2 to 4 grammes (½ to 1 drachm).

Preparations

Aqua Menthæ Piperitæ Concentrata, B.P.—(Aq. Menth. Pip. Conc.)—Concentrated Peppermint Water. Oil of peppermint, 1 in 50. One part added to 39 parts of distilled water yields a preparation which is approximately equivalent in strength to distilled peppermint water, but contains 1·5 per cent. v/v of alcohol (90 per cent.). Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This concentrated water, prepared with 3 per cent. of oil of peppermint, was included in the British Pharmaceutical Codex, 1923.

Aqua Menthæ Piperitæ Destillata, B.P.—(Aq. Menth. Pip. Dest.)—Distilled Peppermint Water. Oil of peppermint, 1 in 1000. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Aqua Menthæ Viridis Concentrata, B.P.C.—(Aq. Menth. Vir. Conc.)—Concentrated Spearmint Water. Oil of spearmint, 1 in 50. One part added to 39 parts of distilled water yields a preparation which is approximately equivalent in strength to distilled spearmint water, but contains 1·5 per cent. v/v of alcohol (90 per cent.). Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Aqua Menthæ Viridis Destillata, B.P.C.—(Aq. Menth. Vir. Dest.)—Distilled Spearmint Water. Oil of spearmint, 1 in 1000. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This water was included in the British Pharmacopœia, 1914, under the name of Aqua Menthæ Viridis.

MENTHOL

(Menthol)

Menthol

$C_{10}H_{20}O = 156{\cdot}2$

Menthol, *l-p*-menthan-3-ol, $CH_3{\cdot}C_6H_9(OH)C_3H_7$, is a saturated cyclic alcohol, which is obtained from the volatile oils of various species of *Mentha*, and is imported into England chiefly from Japan. It is obtained mainly from *M. arvensis* var. *piperascens* Holmes in Japan, var. *glabrata* Holmes in China and *M. piperita* Linn. in America, and is separated from the oils by freezing. Menthol occurs in colourless, acicular or prismatic crystals, with a penetrating odour similar to that of peppermint, and a warm, aromatic taste, followed by a sensation of coldness. It volatilises slowly at ordinary temperatures but rapidly on warming. Specific gravity, about 0·890; boiling-point, about 216°. The alcoholic solution is lævorotatory and neutral to litmus. When triturated with camphor, thymol and other substances, the mixture liquefies. It is readily identified by means of its benzoic ester which is obtained by heating menthol with benzoic anhydride; it has a melting-point of 54·5° and is almost non-volatile in steam. Menthol may be differentiated from thymol, or the presence of the latter in menthol detected, by the addition of 3 drops of sulphuric acid and 1 drop of nitric acid to 1 millilitre of a solution of menthol in glacial acetic acid; no green colouration should be produced. Synthetic menthol, having similar properties but with a melting-point of from 30 to 35°, is also available, and can be obtained in the form of colourless crystals. It is a mixture of stereo-isomerides.

Very **soluble** in alcohol (90 per cent.) (5 in 1), ether (8 in 3), chloroform (about 4 in 1), liquid paraffin (1 in 6), light petroleum (10 in 7), olive oil (1 in 4) and volatile oils; almost insoluble in water and glycerin.

Standard, B.P.—Menthol has a melting-point of 42° to 43°. Residue on volatilisation, not more than 0·05 per cent.

Action and Uses.—Menthol is an antiseptic with a mildly anæsthetic action. When applied to the skin, a sensation of cold is produced, with dilatation of the vessels and a rise in the skin temperature, followed by partial anæsthesia and a feeling of numbness. Menthol is employed occasionally as a carminative, but it is liable to upset digestion. A solution in oil, or a mixture with an inert substance, may be **administered** in capsules, or it may be given in pills massed with powdered soap. When prescribed in pills with camphor, phenol, chloral hydrate,

thymol, or other substance with which menthol liquefies, a small quantity of wax should be added. Pastilles containing menthol, frequently with oil of eucalyptus, are employed for nasal and bronchial catarrh.

Menthol is applied **externally,** in the form of cones, or as a liniment or ointment with methyl salicylate, as an analgesic in neuralgia and rheumatic affections. Menthol is much used as an inhalation or application to inflamed nasopharyngeal and laryngeal mucous membranes. Mixed with camphor and oil of eucalyptus, it is inhaled from cotton wool or from hot water for the relief of catarrh. It is a common ingredient of snuffs, and is used in solution in light liquid paraffin (1 or 2 per cent.) as a spray to the nose or larynx. Menthol ointment (1 per cent. in soft paraffin) is applied to the nares in coryza. Mixtures of equal weights of menthol and chloral hydrate or camphor are applied on cotton wool to carious teeth to allay pain. Vapour rubs are preparations of menthol with other volatile substances in a basis of soft paraffin, and are applied to the chest for their local action and on account of their value when inhaled.

Dose.– 0·03 to 0·12 gramme ($\frac{1}{2}$ to 2 grains).

MENTHYLIS VALERIANAS.—Menthyl valerianate may be prepared by the esterification of menthol with valerianic acid. It occurs as a colourless, pleasantly smelling liquid, insoluble in water and miscible with alcohol, ether and fatty oils. It is used as a nerve sedative and as a remedy for sea-sickness.

Preparations

Aqua Mentholis, B.P.C.—(Aq. Menthol.)—Menthol Water. A saturated solution of menthol in water. Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

Emplastrum Mentholis, B.P.C.—(Emp. Menthol.)—Plaster of Menthol. Menthol, 15 per cent., in yellow beeswax and colophony.

Insufflatio Mentholis, B.P.C.—(Insuff. Menthol.)—Menthol Insufflation. *Syn.*—Insufflatio Mentholis Composita; Menthol Snuff. Menthol, 1 in 20, with ammonium chloride, boric acid and lycopodium.

Insufflatio Mentholis et Cocainæ, B.P.C.—(Insuff. Menthol. et Cocain.)—Menthol and Cocaine Insufflation. *Syn.*—Menthol and Cocaine Snuff. Menthol, 2·5 per cent., and cocaine hydrochloride, 0·14 per cent., with ammonium chloride, camphor and lycopodium.

Nebula Cocainæ Composita, B.P.C.—(Neb. Cocain. Co.)—Compound Cocaine Spray. Cocaine, 0·5 per cent. w/v, in compound menthol and thymol spray.

Nebula Guaiacolis et Mentholis, B.P.C.—(Neb. Guaiacol. et Menthol.)—Guaiacol and Menthol Spray. Guaiacol, 2 per cent. w/v, and menthol, 4 per cent. w/v, in light liquid paraffin.

Nebula Iodi et Mentholis, B.P.C.—(Neb. Iod. et Menthol.)—Iodine and Menthol Spray. Iodine, 2 per cent. w/v, and menthol, 4 per cent. w/v, in light liquid paraffin.

Nebula Mentholis et Thymolis Composita, B.P.C.—(Neb. Menthol. et Thymol. Co.)—Compound Menthol and Thymol Spray. Menthol, camphor and phenol, of each 2 per cent. w/v, and thymol, 0·2 per cent. w/v, in light liquid paraffin.

Pastilli Mentholis et Cocainæ, B.P.C.—(Pastil. Menthol. et Cocain.)—Menthol and Cocaine Pastilles. Each pastille contains menthol, $\frac{1}{20}$ grain, and cocaine hydrochloride, $\frac{1}{40}$ grain.

Pastilli Mentholis et Eucalyptolis, B.P.C.—(Pastil. Menthol. et Eucalyp.)—Menthol and Eucalyptol Pastilles. Each pastille contains menthol, $\frac{1}{10}$ grain, and eucalyptol, $\frac{1}{2}$ minim.

Pigmentum Mentholis et Tolueni, B.P.C.—(Pig. Menthol. et Toluen.)—Menthol and Toluene Paint. *Syn.*—Löffler's Paint. Menthol, 10 per cent. w/v, with dehydrated alcohol, strong solution of ferric chloride and toluene.

Spiritus Mentholis, B.P.C.—(Sp. Menthol.)—Spirit of Menthol. Menthol, 1 in 20, in alcohol (90 per cent.).

Spiritus Mentholis Compositus, B.P.C.—(Sp. Menthol. Co.)—Compound Spirit of Menthol. Camphor, menthol, terebene and eucalyptol, of each 1 in 10, in alcohol (90 per cent.). Dose.– 10 drops, by inhalation.

MERCUROCHROMUM

(Mercurochrom.)

Mercurochrome

Synonym—Mercurochrome, 220 Soluble.

Mercurochrome consists chiefly of the disodium salt of dibromohydroxymercury-fluorescein, $C_{20}H_8O_6Br_2Na_2Hg$, and may be prepared by the interaction of dibromofluorescein and mercuric acetate. It occurs as greenish, iridescent scales or granules, giving a dark red aqueous solution which, on dilution, shows a marked green fluorescence.

Readily **soluble** in water; almost insoluble in alcohol; insoluble in chloroform and ether.

Standard.—Mercurochrome contains not less than 25 per cent. and not more than 28 per cent. of Hg, and not less than 21 per cent. and not more than 23 per cent. of Br, both calculated on the substance dried in a vacuum at 50° over sulphuric acid. Loss on drying in a vacuum at 50° over sulphuric acid, not more than 10 per cent. Dissolve 2·5 grammes in 50 millilitres of water at 15°, and allow to stand for twenty-four hours; centrifuge, and wash the deposit with water until the washings are colourless; dissolve the residue in 2 millilitres of nitric acid, warm slightly, dilute to 25 millilitres, and titrate with N/10 ammonium thiocyanate, using ferric ammonium sulphate as indicator; not more than 1 millilitre of N/50 ammonium thiocyanate is required (limit of free mercury). Dissolve 0·1 gramme in 10 millilitres of water, add 1 millilitre of N/1 sulphuric acid, allow to stand for five minutes, and filter; to the filtrate add 1 millilitre of hydrogen sulphide solution; the solution shows not more than a slight darkening in colour (limit of soluble mercury salts). Residue on ignition with sulphuric acid, not more than 22 per cent. (limit of sodium).

When used for intravenous injection, it complies with the test for toxicity.

Assay.—For mercury. Dissolve about 0·5 gramme, accurately weighed, in 10 millilitres of water. Add 100 millilitres of alcohol

(95 per cent.), 10 millilitres of hydrochloric acid and 1 gramme of zinc powder, and set aside in a warm place so that a steady evolution of gas proceeds. After one hour add 10 millilitres of hydrochloric acid and 1 gramme of zinc powder, and repeat the addition after another hour. Decant the solution through a filter and wash the residual amalgam twice with 10 millilitres of alcohol (95 per cent.) and then with water until free from chloride. Dissolve the residual amalgam, together with any collected on the filter, in 20 millilitres of nitric acid; add about 0·5 gramme of urea, warm on a water-bath, dilute to about 60 millilitres, and add N/10 potassium permanganate until a permanent pink colour is obtained. Decolourise with a few drops of ferrous sulphate solution, and titrate with N/10 ammonium thiocyanate, using ferric ammonium sulphate as indicator. Each millilitre of N/10 ammonium thiocyanate is equivalent to 0·01003 gramme of Hg.

For bromine. Mix 0·3 gramme in a porcelain crucible with 1 gramme of potassium nitrate, 2 grammes of potassium carbonate and 2 grammes of anhydrous sodium carbonate, and cover the surface with 2 grammes of a mixture of equal parts of anhydrous sodium and potassium carbonates; heat gently for twenty minutes, and finally heat strongly until completely fused; dissolve the cooled mass in water, acidify with nitric acid, add 20 millilitres of N/10 silver nitrate, and titrate with N/10 ammonium thiocyanate, using ferric ammonium sulphate as indicator; each millilitre of N/10 silver nitrate is equivalent to 0·007992 gramme of Br.

Test for Toxicity.—Mercurochrome has a toxicity, when injected intravenously into mice, which does not exceed the toxicity of the standard preparation of mercurochrome. The standard preparation of mercurochrome is a quantity of mercurochrome kept by the Pharmaceutical Society of Great Britain. The comparison between the toxicity of a sample of mercurochrome and that of the standard preparation is made in the following way. The average lethal dose of the standard preparation is first determined by injecting mice with the standard preparation. The mice should be, as far as possible, of the same weight, and should not differ by more than 8 grammes; they are prepared by removing food from their cages on the evening before they are to be injected; a solution of the standard preparation is made in freshly-distilled water, and is injected into each mouse by way of a tail vein. The volume injected is adjusted according to the body weight, so that 0·4 millilitre is given per 20 gramme weight of mouse. After they are injected, the mice are given food and observed during seven days to determine the number of mice which die. The average lethal dose is that dose which kills exactly one-half of a group of not less than thirty mice. A dose of the sample being tested equal to the average lethal dose of the standard preparation is then injected into each of ten mice, taking the precautions described. If not more than two mice die, the sample passes the test. When more than two mice die, the same dose of the sample being tested is injected into each of ten more mice. If the number of mice which die out of the twenty mice

injected is not greater than eight, the sample being tested passes the test, if, however, the number of mice which die is greater than fifteen the sample being tested is rejected. When the number of deaths is more than eight, but less than fifteen, a third group of ten mice is given the same dose of the sample being tested. If the number of mice which die out of the thirty mice injected is not greater than fifteen, the sample being tested passes the test; if the number is greater than fifteen, the sample being tested fails to pass the test.

Action and Uses.—Mercurochrome has been stated to possess a high degree of bactericidal action *in vitro*, but laboratory experiments indicate that it is relatively weak in its action. It is significant that it was introduced as a urinary antiseptic, and that the experiments were made in an acid medium. Mercurochrome is a more powerful antiseptic in an acid medium than in a neutral or alkaline medium, and it has been suggested that this feature is due to decomposition by acid with formation of mercuric compounds. It would appear that its use intravenously as an antiseptic is of no value, although it has been used by this route in obstinate cases of *B. coli* pyelitis, in gonorrhœa and in septicæmia. As it is excreted partly in the bile, its use has been advocated as a biliary antiseptic. For irrigation of the bladder in cystitis, and of the urethra in gonorrhœa, its use in 1 per cent. solution has been much vaunted, and good results claimed.

As a local application to ulcers, erysipelas and cellulitis, mercurochrome has its advocates, although laboratory experiments indicate that it possesses only a feeble bactericidal action towards both streptococci and staphylococci. For local application to wounds, a 1 to 4 per cent. w/v solution in water may be employed, and for skin sterilisation, a 2 per cent. w/v solution in a mixture of water, 3 parts, alcohol, 55 parts, and acetone, 10 parts, has been recommended. Absorbent gauze containing about 0·1 per cent. of mercurochrome has been used as a dressing. 2 to 5 milligrams per kilogram of body-weight, as a 0·5 per cent. solution, may be used intravenously, although injections of this amount should not be given at more frequent intervals than three days. Its toxicity may be reduced by the addition of dextrose to the solution immediately before injection. Acute mercurial poisoning is said to have been observed after the intravenous administration of mercurochrome. Solutions of mercurochrome for **injection** should be prepared by aseptic methods. Mercurochrome is **incompatible** with acids, the salts of most alkaloids, and with many local anæsthetics.

METHYLACETANILIDUM

(Methylacetanilid.)

Methylacetanilide

$C_9H_{11}ON = 149·1$

Methylacetanilide, $C_6H_5N(CH_3)OC·CH_3$, may be prepared by treating monomethylaniline with acetic anhydride. When the reaction is

completed, the acicular crystals formed after cooling are collected and recrystallised from boiling water or dilute alcohol. It occurs in the form of colourless crystals, having a slightly saline taste. It readily forms supersaturated solutions in water. On heating with sodium hydroxide or sulphuric acid, it is decomposed into acetic acid and monomethylaniline, which, on treatment with solution of nitrous acid, yields a nitroso-compound which is insoluble in sodium hydroxide.

Soluble in water (1 in 60), boiling water (1 in 2), chloroform (1 in 2) and ether (1 in 10); very easily soluble in alcohol, both strong and diluted.

Standard.—Methylacetanilide melts between 100° and 101°. Ash, not more than 0·1 per cent.

Action and Uses.—Methylacetanilide resembles acetanilide, but its action is more powerful. It is used as an analgesic and antispasmodic for the relief of pain in neuralgia, sciatica and migraine. Methylacetanilide may be **administered** in solution in water, or in cachets or pills. It is not advisable to exceed 2 grains for a single dose. In case of **poisoning,** an emetic should be given, followed by stimulants and artificial respiration.

Dose.– 0·03 to 0·12 gramme ($\frac{1}{2}$ to 2 grains).

METHYLIS SALICYLAS

(Methyl. Salicyl.)

Methyl Salicylate

$C_8H_8O_3 = 152·1$

Methyl salicylate, $C_6H_4(OH)\cdot COOCH_3$, is the methyl ester of salicylic acid, and may be prepared by dissolving salicylic acid in methyl alcohol, then gradually adding sulphuric acid, warming for about twenty-four hours, and distilling in a current of steam. It occurs as a colourless or pale yellow, oily liquid, with a strong, characteristic, aromatic odour, and a warm, sweet, aromatic taste. The aqueous solution is neutral or slightly acid to litmus, and yields an intense violet colouration on the addition of a trace of ferric chloride.

Slightly **soluble** in water; miscible with alcohol (90 per cent.), ether, chloroform, glacial acetic acid, carbon disulphide, and fixed and volatile oils.

Standard, B.P.—Methyl salicylate contains not less than 98 per cent. of $C_8H_8O_3$. Specific gravity, 1·186 to 1·191; refractive index at 20°, 1·536 to 1·538. It is soluble in 10 volumes of alcohol (70 per cent.), and complies also with a limit test for free acid.

Action and Uses.—Methyl salicylate has the general action of salicylates; in addition, it is readily absorbed when rubbed on the skin. The drug is occasionally given internally, when it should be dispensed

in capsules, preferably with an inert oil as diluent. It is applied **externally** in lumbago, sciatic and rheumatic conditions, either alone, or as a liniment, or as an ointment with a basis of lanolin. The undiluted substance may be painted on the skin and covered with oiled silk or gutta-percha tissue, or it may be mixed with an equal volume of oil and applied with gentle friction, or on lint. It is used as a flavouring agent in mouth-washes and tooth pastes. The symptoms of **poisoning** with methyl salicylate are those of acidosis, and should be treated by the administration of alkalis, dextrose and insulin.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

ÆTHYLIS SALICYLAS.—Ethyl salicylate, $C_6H_4(OH)\cdot COOC_2H_5$ may be prepared by the esterification of ethyl alcohol with salicylic acid. It occurs as a transparent, colourless liquid, having an odour similar to that of the methyl ester and boiling at about 230°. It is used for the same purposes as methyl salicylate but is said to be less toxic and less irritant in its action. Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

AMYLIS SALICYLAS.—Amyl salicylate, $C_6H_4(OH)\cdot COOC_5H_{11}$, may be prepared by the esterification of amyl alcohol with salicylic acid. It occurs as a colourless oil, having a powerful, fragrant odour, a specific gravity of about 1·055 and a boiling-point of about 278°. It is used in perfumery, particularly in the preparation of synthetic carnation perfumes.

Preparations

Linimentum Methylis Salicylatis, B.P.C.—(Lin. Methyl. Salicyl.)—Liniment of Methyl Salicylate. *Syn.*—Linimentum Betulæ Compositum; Compound Liniment of Birch. Rectified oil of camphor, 1 in 4, with menthol, oil of eucalyptus and methyl salicylate.

Linimentum Methylis Salicylatis Compositum, B.P.C.—(Lin. Methyl. Salicyl. Co.)—Compound Liniment of Methyl Salicylate. Rectified oil of camphor, 1 in 4, with menthol, chloral hydrate, methyl salicylate and chlorophyll.

Linimentum Methylis Salicylatis Oleosum, B.P.C.—(Lin. Methyl. Salicyl. Oleos.)—Liniment of Methyl Salicylate with Oil. *Syn.*—Linimentum Methylis Salicylatis Simplex. Methyl salicylate, 1 in 4, with rape oil.

Unguentum Methylis Salicylatis, B.P.C.—(Ung. Methyl. Salicyl.)—Methyl Salicylate Ointment. *Syn.*—Unguentum Methylis Salicylatis Forte; Strong Methyl Salicylate Ointment. Methyl salicylate, 50 per cent., in white beeswax and hydrous wool fat.

Unguentum Methylis Salicylatis Compositum, B.P.C.—(Ung. Methyl. Salicyl. Co.)—Compound Methyl Salicylate Ointment. *Syn.*—Unguentum Methylis Salicylatis Compositum Forte; Strong Compound Ointment of Methyl Salicylate; Unguentum Betulæ Compositum; Unguentum Analgesicum; Analgesic Balsam. Methyl salicylate, 50 per cent., and menthol, 10 per cent., with eucalyptol and oil of cajuput, in white beeswax and hydrous wool fat.

Unguentum Methylis Salicylatis Compositum Dilutum, B.P.C.—(Ung. Methyl. Salicyl. Co. Dil.)—Dilute Compound Methyl Salicylate Ointment. Compound methyl salicylate ointment, 25 per cent., in hydrous wool fat ointment.

Unguentum Methylis Salicylatis Dilutum, B.P.C.—(Ung. Methyl. Salicyl. Dil.)—Dilute Methyl Salicylate Ointment. Methyl salicylate ointment, 25 per cent., in hydrous wool fat ointment.

METHYLSULPHONAL

(Methylsulphonal)

Methylsulphonal

$C_8H_{18}O_4S_2 = 242{\cdot}3$

Methylsulphonal, $(CH_3)(C_2H_5)C(SO_2{\cdot}C_2H_5)_2$, is diethylsulphonemethylethylmethane, and is prepared by the interaction of methylethylketone and ethyl mercaptan, and oxidising the resulting mercaptol with potassium permanganate; the product is then purified by recrystallisation from boiling water. Methylsulphonal occurs in the form of colourless, odourless, lustrous, crystalline scales, or as a crystalline powder, with a slightly bitter taste. When heated alone, it is decomposed, with evolution of sulphur dioxide; heated with anhydrous sodium acetate, hydrogen sulphide is given off; heated with powdered charcoal, the unpleasant odour of mercaptan is evolved.

Soluble in water (1 in 320), alcohol (90 per cent.) (1 in 12), and in ether.

Standard, B.P.—Methylsulphonal has a melting-point of 76° to 78°. Ash, not more than 0·05 per cent. It complies also with limit tests for free acid, and for readily oxidisable substances.

Action and Uses.—Methylsulphonal is a hypnotic resembling sulphonal, but is more rapid in its action. It has the disadvantages of slow excretion and ready accumulation exhibited by sulphonal, and hence is rarely used. It is best **administered** in cachets, swallowed with a large draught of hot liquid. In cases of **poisoning,** excretion can be assisted by giving alkaline liquids.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

METHYLTHIONINÆ CHLORIDUM

(Methylthionin. Chlor.)

Methylene Blue

$C_{16}H_{18}N_3ClS = 319{\cdot}7$

Synonym—Methylthionine Chloride.

Methylene blue is tetramethylthionine chloride, and may be prepared by treating dimethyl-*p*-phenylenediamine with an oxidising agent in the presence of sodium thiosulphate; the thiosulphonic acid thus obtained is further oxidised in the presence of dimethylaniline and the product boiled with acid to yield the leuco-compound, from which methylene blue is obtained by treatment with ferric chloride. It occurs as an almost odourless, dark greenish, crystalline powder, with a metallic lustre, or as a dull, dark green or brown powder. An aqueous

solution, 1 in 10,000, is of a clear, deep blue colour, and responds to the following tests: the colour is discharged when the solution is warmed with zinc powder and acetic acid, but reappears when the liquid is filtered and exposed to the air; on the addition of potassium iodide, a deep blue, flocculent precipitate is formed and settles slowly, leaving a blue, supernatant liquid; when a few drops of N/10 solution of potassium dichromate are added to the aqueous solution, slightly acidified with dilute sulphuric acid, a bluish-violet precipitate is formed, the liquid becoming reddish-violet, and the blue colour is restored on the addition of sulphurous acid; on the addition of a few drops of a solution of iodine, a deep brown colouration is produced, the blue colour being restored on the addition of a few drops of sodium thiosulphate solution. Commercial methylene blue is the double chloride of tetramethylthionine and zinc, and is not suitable for medicinal use.

Soluble in water (about 1 in 50), alcohol (90 per cent.) and chloroform.

Standard, B.P.—Methylene blue contains not less than 80 per cent. of $C_{16}H_{18}N_3ClS$. Arsenic limit, 10 parts per million. It complies also with a limit test for zinc.

Action and Uses.—Methylene blue is slightly antiseptic, and when taken internally it is excreted almost entirely by the kidneys. For this reason it is employed in such infections as gonorrhœa and catarrhal inflammation of the bladder. *In vitro*, it has a marked trypanocidal action, and destroys protozoa and parasitic worms. It was formerly employed as an analgesic in migraine, neuralgia, sciatica and other rheumatic affections, but it is of doubtful value in these conditions. It has also been used in cases of malaria where quinine is tolerated badly, but it is much inferior to alkaloids of cinchona. Methylene blue has some curative value in the treatment of piroplasmosis, but is inferior to trypan blue. In large doses methylene blue is irritating. The drug is **administered** usually in the form of pills, capsules, or tablets, which should be taken with a draught of water. A lotion containing 0·25 per cent. w/v of the dye has been used in ozœna, and irrigations with solutions 1 in 1000 to 1 in 500 have been employed in cystitis.

A solution of methylene blue is injected intramuscularly as a test for permeability of the kidney. Cystoscopic observations are made of the first appearance of the dye in the urine. In normal conditions of the kidney, the urine assumes a greenish colour in about thirty minutes. The rate of excretion serves as an indication of the degree of renal lesion. Solutions for **injection** may be sterilised by heating in an autoclave or by tyndallisation. Solutions of methylene blue are largely used as stains for bacteria, Lœffler's alkaline solution being employed as a counterstain for acid-fast bacteria, and Neisser's acid solution being used as a stain for diphtheria bacilli. Methylene blue stains on the skin or on fabrics may be removed by the use of solution of chlorinated soda.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

METHYLVIOLA
(Methylviola)
Methyl Violet

Synonym—Methyl Rosaniline.

Methyl violet (Colour Index No. 680) is a mixture of the hydrochlorides of the more highly methylated pararosanilines, containing principally tetra-, penta-, and hexamethylpararosanilines, formed by air oxidation of dimethylaniline and phenol, in the presence of sodium chloride and copper sulphate. It occurs as a greenish mass with a metallic lustre, or as a green, crystalline powder. It is precipitated from aqueous solution by tannic acid, and is decolourised by the action of hydrochloric acid and zinc powder, a blue colour being produced on the further addition of a slight excess of ammonia. On the gradual addition of hydrochloric acid to a 0·2 per cent. aqueous solution, the colour is changed through bluish-green and green to brownish-yellow, and on further dilution of the solution the colours are restored in reverse order. The colour base is precipitated by alkalis.

Soluble in water (1 in 20), glycerin (1 in 16), alcohol (1 in 20), the solution having a violet colour and being decomposed by exposure to light; insoluble in ether.

Standard.—Methyl violet leaves not more than 5 per cent. of sulphated ash. Arsenic limit, 10 parts per million. Not more than 1 per cent. is insoluble in boiling alcohol (limit of dextrin). Dissolve the sulphated ash from 1 gramme in 20 millilitres of water and 2 millilitres of dilute hydrochloric acid, and add 1 millilitre of potassium ferrocyanide solution; no precipitate is produced (limit of zinc).

Action and Uses.—Methyl violet is a powerful antiseptic. It is rarely used in medicine, but is employed as a bacteriological stain. For local use in gynæcological practice, and for administration intravenously in the treatment of staphylococcal septicæmia, crystal violet should be used (see Viola Crystallina).

MEZEREUM
(Mezer.)
Mezereon

Synonym—Mezereon Bark.

Mezereon consists of the dried bark obtained from *Daphne Mezereum* Linn. and *D. Laureola* Linn., both indigenous to Britain, and from *D. Gnidium* Linn. (Fam. Thymelæaceæ), indigenous to Southern Europe and Algeria.

The bark occurs in long, thin, flattened or quilled, very tough and flexible strips, about 0·5 to 2 centimetres wide, and having a papery cork which easily separates. The outer surface of the bark of *D. Mezereum* is

olive-brown or yellowish and finely wrinkled transversely, that of the stem showing scattered, rounded scars of buds and leaves; the inner surface is smooth, whitish or yellowish, and silky, and the fracture is tough and fibrous. The cortex of the stem is green and that of the root is yellowish. The outer surface of the bark of *D. Laureola* is purplish-grey, the scars of the buds and leaves being pointed-oval and crowded at intervals. It is odourless, and the taste is persistent, burning and acrid.

Mezereon **contains** a greenish-brown, amorphous, acrid resin (mezerein), which readily changes into a bitter, acid resin (mezereic acid). The crystalline, bitter glycoside, daphnin, fixed oil, and a substance resembling euphorbone have also been isolated, but none of these is acrid.

Standard.—Mezereon yields not more than 2 per cent. of acid-insoluble ash.

Mezereon, in powder (Pulvis Mezerei : Pulv. Mezer.), contains the constituents of Mezereum, and complies with the standard for the unground drug.

Action and Uses.—Mezereon is not much used medicinally. It is an ingredient of Decoctum Sarsæ Compositum Concentratum. Applied externally, it is stimulant and vesicant.

MORPHINA
(Morph.)

Morphine

$C_{17}H_{19}O_3N,H_2O = 303{\cdot}2$

Morphine is the principal alkaloid occurring in opium, in which it exists in combination with meconic acid and sulphuric acid to the extent of from 8 to 20 per cent. or even more. It may be isolated by various methods, the final step usually being the addition of ammonia in slight excess to an acid solution of the base, the precipitate being washed with water until free from ammonium salt, and recrystallised from boiling alcohol.

It occurs in fine, odourless, colourless or white, needle-shaped crystals, or as a white, crystalline powder, permanent in air and having a bitter taste. Its aqueous solution is alkaline to litmus and is lævorotatory. It loses its water of crystallisation at about 100°, and melts with decomposition above 230°. The morphine molecule contains two hydroxyl groups, one of which is phenolic, and by interaction with alkyl halides and analogous compounds it yields derivatives which are known as ethers; by interaction with acids, acyl and similar radicles may be introduced with formation of esters. Codeine and ethylmorphine in this respect are ethers, whilst diamorphine is an ester. The esters are readily hydrolysed, but the ethers are more stable.

Dilute solutions of morphine in a slight excess of sulphuric acid

give a brown colouration on adding a saturated solution of potassium iodate and allowing to stand for a few minutes, the colour being intensified by the addition of excess of ammonia. Very dilute solutions in decinormal hydrochloric acid yield a yellowish-brown colour on the addition of sodium nitrite solution followed by excess of ammonia. These two reactions are used for the purpose of determining very small amounts of the alkaloid colorimetrically. The solid alkaloid, when moistened with ferric chloride solution, gives a deep greenish-blue colour; it also gives an orange-red colour with nitric acid, and a violet colour with sulphomolybdic acid. Morphine solutions added to potassium ferricyanide solution containing a drop of neutral ferric chloride give a deep blue solution which, on standing, throws down a blue precipitate (distinction from codeine).

Soluble in water (1 in 5000), boiling water (about 1 in 400), alcohol (1 in 100), boiling alcohol (1 in 14), chloroform (1 in 4000) and benzene (1 in 3250); almost insoluble in ether and ethyl acetate, and not very soluble in amyl alcohol; soluble in oleic acid (1 in 10), glycerin (1 in 125), and in solutions of the caustic alkalis, but very sparingly soluble in ammonia and the alkali carbonates; soluble in acids to form crystalline salts, from solutions of which it is precipitated by ammonia but not by potassium hydroxide.

Standard.—Morphine loses on drying at 110° not more than 7 per cent. of its weight. Ash, not more than 0·1 per cent. A solution in dilute hydrochloric acid complies with the limit test for other alkaloids in Morphinæ Hydrochloridum, using three-quarters of the weight there specified.

Action and Uses.—Morphine and its salts differ from other hypnotics in that they depress sensory nerve cells in the cerebrum, while most other hypnotics paralyse motor and sensory cells simultaneously. Because of this action on the cerebral hemispheres, morphine is the most valuable drug for the treatment of pain. It is of great value as a remedy for sleeplessness due to painful disease. For internal hæmorrhage, injections of morphine form a routine treatment; they act by soothing the patient, stopping restlessness, and so keeping blood pressure low. In acute febrile disease, especially where sleep is delayed, morphine is invaluable; it is used in the treatment of pneumonia and in conditions where normally the drug might even be contra-indicated, it being considered that the benefit secured by relief of pain and sleeplessness, with their attendant exhaustion, may more than compensate any disadvantage. It is less valuable in the treatment of mania, epilepsy and chorea than many other narcotics. Morphine depresses the medulla generally, including the respiratory centre, diminishes gaseous metabolism, and is used to arrest useless cough, but its employment is contra-indicated in conditions where there is much expectoration. It is largely prescribed with expectorants in the coughs of phthisis. It is useful in cases of acute asthma, and gives relief in hiccough. Occasionally it causes nausea and vomiting, and with some individuals this action would appear to be an idiosyncrasy

Since morphine has a specific action on the alimentary canal, diminishing peristalsis, it is employed in the treatment of diarrhœa and colic, especially that due to lead. In peritonitis it is especially valuable, diminishing the pain, restlessness and peristaltic movements; it should not be given, however, until a diagnosis has been made. Morphine has few peripheral actions, it does not affect the heart or peripheral circulation, and so is invaluable in the insomnia of cardiac disease. It has no effect on the kidneys, but is better avoided in renal disease on account of its constipating effect. Morphine tends, in general, to diminish secretions, but, since it dilates skin vessels, the excretion of sweat is increased. In diarrhœa, opium is preferred to morphine; for the relief of pain, morphine is preferable. Morphine constipates chiefly by contracting the pyloric and ileo-cæcal valves; opium constipates in the same way with the addition of a general relaxation of the rest of the intestinal muscle brought about by the narcotine and papaverine.

Tolerance to morphine is caused by the greater ability of the tissues to oxidise the alkaloid. The danger of habit-forming is very real, and great discrimination is required in prescribing the drug. Addicts require increasing quantities to satisfy their craving, and enormous doses are sometimes needed to produce the effect desired. Children and the aged are especially susceptible to morphine, and it must be prescribed for them with the very greatest care. It has, however, been stated frequently that the susceptibility in children applies only to infants still at the breast, and that after one year it appears to pass off.

For **internal** administration, the soluble salts of morphine are usually dispensed. The alkaloid is employed only when oily solutions are required. For the preparation of a solution in oil, the alkaloid is usually dissolved in ten times its weight of oleic acid, and the oleate so formed mixed with the oily vehicle; ointments containing 2 to 5 per cent. of morphine may be prepared similarly. Acute morphine **poisoning** has to be distinguished from certain cerebral conditions, intoxication, concussion and hæmorrhage; the equal pin-point pupils which do not react to light form a valuable aid in diagnosis. Treatment of poisoning by morphine consists in washing out the stomach with dilute potassium permanganate solution two or three times at intervals of thirty minutes. Artificial respiration and inhalation of oxygen must be employed if necessary. Atropine, hot coffee, caffeine, or strychnine may be used to excite the respiratory centre.

Dose.– 0·008 to 0·02 gramme ($\frac{1}{8}$ to $\frac{1}{3}$ grain).

MORPHINÆ ACETAS
(Morph. Acet.)

Morphine Acetate

$C_{17}H_{19}O_3N,C_2H_4O_2,3H_2O = 399{\cdot}2$

Morphine acetate may be prepared by neutralising freshly precipitated morphine, diffused in water, with acetic acid, evaporating on a

water-bath until the solution solidifies on cooling and, finally, carefully drying the salt at a gentle heat, when it may be powdered. It cannot be dried without some little decomposition occurring, acetic acid being liberated. It occurs as a white or yellowish-white, amorphous or crystalline powder, having a faintly acetous odour, especially when the vessel containing it is freshly opened. Samples which have been kept for any length of time become basic, owing to loss of acetic acid, and brownish in colour. In making aqueous solutions, a little free acetic acid is usually required to replace that lost during spontaneous decomposition. The alcoholic solution when mixed with ether deposits crystals of the base, free acetic acid remaining in solution. When heated, the salt loses water and acetic acid, and melts at about 200°. It contains the equivalent of about 71 per cent. of anhydrous morphine. In neutral solutions, ferric chloride produces a blue colour which is destroyed by acids, alcohol, or by heating. It yields the colour reactions given under Morphina. It should be **stored** in well-stoppered, amber-coloured bottles.

Soluble in water (1 in 2·5), alcohol (1 in 100) and glycerin (1 in 5); insoluble in ether.

Standard.—Morphine acetate leaves not more than 0·1 per cent. of ash. It complies with the limit test for other alkaloids in Morphinæ Hydrochloridum.

Action and Uses.—Morphine acetate has the general medicinal properties of the salts of morphine, but is little used owing to the tendency, both of the salt and its solutions, to undergo change. It may be administered as Liquor Morphinæ Acetatis. Solutions for **injection** may be sterilised by tyndallisation or by filtration. The containers should comply with the tests for limit of alkalinity of glass, and the solution should be stored protected from light. Morphine acetate is **incompatible** with solution of ammonia and vegetable astringents. In cases of **poisoning** by morphine acetate, the antidotes are those described for Morphina.

Dose.– 0·008 to 0·02 gramme ($\frac{1}{8}$ to $\frac{1}{3}$ grain).

Preparation

Liquor Morphinæ Acetatis, B.P.C.—(Liq. Morph. Acet.)—Solution of Morphine Acetate. Morphine acetate, 1 per cent. w/v, in dilute acetic acid alcohol (90 per cent.) and distilled water. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

This solution was included in the British Pharmacopœia, 1914.

MORPHINÆ HYDROCHLORIDUM

(Morph. Hydrochlor.)

Morphine Hydrochloride

$C_{17}H_{19}O_3N,HCl,3H_2O = 375·7$

Morphine hydrochloride may be prepared by neutralising morphine,

suspended in hot water, with diluted hydrochloric acid, concentrating the solution and setting it aside to crystallise. Morphine hydrochloride occurs in colourless, odourless, glistening needles or as a crystalline powder, with a bitter taste, and contains about 76 per cent. of anhydrous morphine. The aqueous solution is neutral to litmus and, on the addition of solution of ammonia, yields a white precipitate which dissolves on adding sodium hydroxide solution. It loses its water of crystallisation when heated at 100°, and chars at higher temperatures without melting. When morphine hydrochloride in powder is sprinkled on the surface of a few drops of nitric acid, an orange-red colour is produced; when added to sulphuric acid, containing a trace of solution of formaldehyde, a purple colour is produced. When a small quantity of morphine hydrochloride is heated with sulphuric acid on a water-bath for fifteen minutes, the resulting solution, when cooled and treated with a few drops of dilute nitric acid, gives a blood-red colouration. On the addition of 1 drop of ferric chloride solution to a 1 in 50 aqueous solution, a blue colour is produced.

Morphine hydrochloride may be distinguished from codeine by the immediate production of a bluish-green colour on the addition of potassium ferricyanide solution containing a trace of ferric chloride. A dilute aqueous solution, slightly acidified with dilute sulphuric acid, gives with potassium iodate solution a brown colouration reaching maximum intensity in about five minutes; on the addition of solution of ammonia, the colour changes nearly to black. This reaction serves to distinguish morphine from both codeine and diamorphine. Morphine hydrochloride should be **stored** in well-closed containers and protected from light.

Soluble in water (1 in 25), boiling water (1 in 1), alcohol (90 per cent.) (1 in 50), glycerin (1 in 8). Insoluble in ether and chloroform.

Standard, B.P.—Morphine hydrochloride loses on drying at 120° not more than 14·5 per cent. of its weight, the dried material being not more than faintly yellow in colour. Ash, not more than 0·1 per cent. It complies also with limit tests for other alkaloids and for readily-carbonisable substances.

Action and Uses.—Morphine hydrochloride has the general medicinal properties of the salts of morphine. It is one of the most stable salts of the alkaloid and, where its solubility permits, it is preferred to the salts of the organic acids. Liquor Morphinæ Hydrochloridi is the most convenient preparation for general **administration.** Atropine sulphate ($\frac{1}{300}$ or $\frac{1}{100}$ grain) is frequently added to morphine injections to increase their analgesic effect, to lessen their tendency to cause constipation, and especially to reduce spasm. A solution for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. The containers should comply with the tests for limit of alkalinity of glass, and the solution should be stored protected from light. For use as mildly sedative and expectorant lozenges, Trochiscus Morphinæ and Trochiscus Morphinæ et Ipecacuanhæ are suitable.

Morphine hydrochloride is sometimes given in pills, prepared by triturating it with lactose and massing with syrup of liquid glucose. Insufflatio Bismuthi et Morphinæ is used in nasal catarrh. Morphine hydrochloride is **incompatible** with solution of ammonia and vegetable astringents. In cases of **poisoning** by morphine hydrochloride, the antidotes are those described for Morphina.

Dose.– 0·008 to 0·02 gramme ($\frac{1}{8}$ to $\frac{1}{3}$ grain).

Preparations

Injectio Morphinæ, B.P.C.—(Inj. Morph.)—Injection of Morphine. It contains 2·5 per cent. w/v of morphine hydrochloride; 0·6 millilitre contains 0·015 gramme, and 10 minims contains about $\frac{1}{4}$ grain, of morphine hydrochloride. Dose.– 0·3 to 0·6 millilitre (5 to 10 minims), by subcutaneous injection.

This injection, prepared with 2·5 per cent. w/v of morphine tartrate, was included in the British Pharmacopœia, 1914, under the name of Injectio Morphinæ Hypodermica.

Insufflatio Bismuthi et Morphinæ, B.P.C.—(Insuff. Bism. et Morph.)—Bismuth and Morphine Insufflation. *Syn.*—Ferrier's Snuff; Bismuth and Morphine Snuff. Bismuth subnitrate, 75 per cent., and morphine hydrochloride, 0·4 per cent., with acacia.

Liquor Morphinæ Hydrochloridi, B.P.—(Liq. Morph. Hydrochlor.)—Solution of Morphine Hydrochloride. It contains 1 per cent. w/v of morphine hydrochloride (limits, 0·95 to 1·05) in dilute hydrochloric acid, alcohol (90 per cent.) and distilled water. 2 millilitres contains 0·02 gramme, and 30 minims contains about $\frac{1}{4}$ grain, of morphine hydrochloride. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Mistura Chloroformi Composita, B.P.C.—(Mist. Chlorof. Co.)—Compound Chloroform Mixture. *Syn.*—Mistura Tussi Sedativa; Mistura Tussi Rubra. Each fluid drachm contains 15 minims of dilute hydrobromic acid and $\frac{1}{20}$ grain of morphine hydrochloride, with chloroform, solution of bordeaux B, cherry-laurel water, syrup of tolu and syrup. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Suppositorium Morphinæ, B.P.—(Supp. Morph.)—Morphine Suppository. Each suppository contains 0·015 gramme ($\frac{1}{4}$ grain) of morphine hydrochloride.

Tinctura Chloroformi et Morphinæ, B.P.C.—(Tinct. Chlorof. et Morph.)—Tincture of Chloroform and Morphine. *Syn.*—Chlorodyne; Tinct. Chlorof. et Morph. B.P. 1885. Chloroform, 1 in 8, morphine hydrochloride, about 1 in 450, and dilute hydrocyanic acid, about 1 in 16, with ether, alcohol (90 per cent.), oil of peppermint, liquid extract of liquorice, treacle and syrup. Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

Tinctura Chloroformi et Morphinæ Composita, B.P.C.—(Tinct. Chlorof. et Morph. Co.)—Compound Tincture of Chloroform and Morphine. Chloroform, about 1 in 13, morphine hydrochloride, 1 in 100, with dilute hydrocyanic acid, about 1 in 20, tincture of capsicum, tincture of cannabis, oil of peppermint, glycerin and alcohol (90 per cent.). Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This tincture was included in the British Pharmacopœia, 1914.

Trochisci Chlorodyni, B.P.C.—(Troch. Chlorod.)—Chlorodyne Lozenges. Each lozenge contains about $\frac{1}{60}$ grain of morphine hydrochloride with chloroform, ether, oil of peppermint and tincture of capsicum.

Trochisci Morphinæ, B.P.C.—(Troch. Morph.)—Morphine Lozenges. Each lozenge contains about $\frac{1}{30}$ grain of morphine hydrochloride.

This lozenge, containing 0·002 gramme of morphine hydrochloride, was included in the British Pharmacopœia, 1914.

Trochiscus Morphinæ et Ipecacuanhæ, B.P.—(Troch. Morph. et Ipecac.)—Lozenge of Morphine and Ipecacuanha. *Syn.*—Morphine and Ipecacuanha Lozenge. Each lozenge contains approximately 0·002 gramme or $\frac{1}{32}$ grain of morphine hydrochloride and approximately 0·006 gramme or $\frac{1}{10}$ grain of powdered ipecacuanha.

MORPHINÆ SULPHAS

(Morph. Sulph.)

Morphine Sulphate

$(C_{17}H_{19}O_3N)_2,H_2SO_4,5H_2O = 758·5$

Morphine sulphate may be prepared by neutralising morphine with dilute sulphuric acid. It occurs in white, odourless, acicular crystals, or in cubical masses, permanent in the air, and having a bitter taste. It contains the equivalent of about 75 per cent. of anhydrous morphine. It loses three molecules of water at 100°. When heated to about 250° the salt assumes a brown colour, and then chars without melting. Its solution is neutral to litmus, and yields, on the addition of ammonia, a precipitate which responds to the tests for morphine.

Soluble in water (1 in 21) and alcohol (1 in 700); insoluble in ether and chloroform.

Standard.—Morphine sulphate loses on drying at 130° not more than 12 per cent. of its weight. Ash, not more than 0·1 per cent. It complies with the limit test for other alkaloids in Morphinæ Hydrochloridum.

Action and Uses.—Morphine sulphate has the general properties of the salts of morphine and is one of the most suitable salts for hypodermic injection. It is sometimes given with atropine sulphate and hyoscine hydrobromide as a preliminary to general anæsthesia, and with hyoscine hydrobromide it is used to produce "twilight sleep." Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. The containers should comply with the tests for limit of alkalinity of glass, and the solution should be stored protected from light. Morphine sulphate is **incompatible** with solutions of ammonia and vegetable astringents. In cases of **poisoning** by morphine sulphate, the antidotes are those described for Morphina.

Dose.– 0·008 to 0·02 gramme ($\frac{1}{8}$ to $\frac{1}{3}$ grain).

MORPHINÆ TARTRAS

(Morph. Tart.)

Morphine Tartrate

$(C_{17}H_{19}O_3N)_2,C_4H_6O_6,3H_2O = 774·4$

Morphine tartrate may be prepared by neutralising morphine, suspended in water, with tartaric acid, and crystallising the solution.

It occurs in neutral, odourless, minutely acicular crystals, with a bitter taste, and contains the equivalent of about 74 per cent. of anhydrous morphine. It effloresces on exposure to air, becoming anhydrous at 100°. Morphine tartrate responds to the tests described under morphine hydrochloride, the tests with sulphuric acid being carried out on the alkaloidal base separated by the addition of ammonia to the aqueous solution. It should be **stored** in well-closed containers and protected from light.

Soluble in water (1 in 11) and alcohol (90 per cent.) (1 in 600); almost insoluble in ether and chloroform.

Standard, B.P.—Morphine tartrate loses on drying at 100° not more than 7 per cent. of its weight. Ash, not more than 0·1 per cent. It complies also with a limit test for other alkaloids.

Action and Uses.—Morphine tartrate has the general properties of the salts of morphine. Liquor Morphinæ Tartratis is used similarly to the corresponding solution of morphine hydrochloride. Solutions for **injection** may be sterilised by tyndallisation or by filtration. The containers should comply with the tests for limit of alkalinity of glass, and the solution should be stored protected from light. Morphine tartrate is **incompatible** with solutions of ammonia and vegetable astringents. In cases of **poisoning** by morphine tartrate, the antidotes are those described for Morphina.

Dose.– 0·008 to 0·02 gramme ($\frac{1}{8}$ to $\frac{1}{3}$ grain).

Preparation

Liquor Morphinæ Tartratis, B.P.C.—(Liq. Morph. Tart.)—Solution of Morphine Tartrate. Morphine tartrate, 1 per cent. w/v, in alcohol (90 per cent.) and distilled water. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

This solution was included in the British Pharmacopœia, 1914.

MORUS
(Morus)
Mulberry

Mulberry is the fresh, ripe fruit of *Morus nigra* Linn. (Fam. Moraceæ); it is cultivated in Great Britain.

The fruit is a dark purplish-black, globular sorosis, about two centimetres long and slightly less in diameter; it consists of about 40 small, individual fruits, each of which is an achene surmounted by two stigmas, and surrounded by four succulent and confluent perianth parts. The taste is sweet and acidulous. Mulberry **contains** about 10 per cent. of invert sugar, malic and citric acids, colouring matter, pectin, etc.

Action and Uses.—The juice of mulberry is slightly laxative and expectorant, but it is used chiefly as an adjuvant, in the form of Syrupus Mori.

RIBES NIGRUM.—Black currant is the fresh, ripe fruit of *Ribes nigrum* Linn. (Fam. Saxifragaceæ), a shrub of the same habitat as the red currant. The fruit is also similar but larger, being about ten millimetres in diameter and bluish-black in colour. The taste is pleasantly acidic and the aroma strong. Black currant contains about 3 to 4 per cent. of invert sugar, malic and citric acids, pectin and colouring matter. The juice is employed as a flavouring and colouring agent and in the preparation of pastilles and syrups. Black currant, imported or stored in metal containers, may contain excessive quantities of lead and tin.

RIBES RUBRUM.—Red currant is the fresh ripe fruit of *Ribes rubrum* Linn. (Fam. Saxifragaceæ), a shrub cultivated in Britain and in temperate parts of Europe and America. The fruit is a succulent berry, about six millimetres in diameter, spherical, bright red in colour, with a smooth surface, beneath which vascular strands are visible as pale coloured longitudinal lines. The berry bears at its summit the dried remains of the calyx and usually has a short pedicel attached to the base. The taste is very acidic and the odour slightly aromatic. Red currant contains about 2 per cent. of free acid, principally malic and citric acids, about 6 per cent. of invert sugar, red colouring matter, pectin, and about 85 per cent. of water. The ash is about 6 per cent. The juice of the red currant is employed as a flavouring and colouring agent and in the preparation of syrups.

RUBUS IDÆUS.—Raspberry is the fresh, ripe fruit of varieties of *Rubus Idæus* Linn. (Fam. Rosaceæ), removed from the fibrous thalamus; it is cultivated in Great Britain. The fruit is a red, hollow, elongated-hemispherical etærio of about 40 to 50 drupels; the etærio is about 10 to 17 millimetres long; each drupel is covered with numerous unicellular, linear trichomes and bears at its apex a style about 4 millimetres long. Raspberry contains about 7 per cent. of invert sugar, citric acid, a red colouring matter, pectin, gum and traces of volatile oil and malic acid. The juice of the raspberry is employed as a flavouring agent.

Preparations

Syrupus Mori, B.P.C.—(Syr. Mori)—Syrup of Mulberry. A solution of sucrose in the juice expressed from mulberry fruit, containing also alcohol (90 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Syrupus Ribis Nigri, B.P.C.—(Syr. Ribis Nig.)—Syrup of Black Currant. A solution of sucrose in the juice expressed from a mixture of black currant with a small proportion of red cherry. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Syrupus Ribis Rubri, B.P.C.—(Syr. Ribis Rub.)—Syrup of Red Currant. A solution of sucrose in the juice expressed from a mixture of red currant with a small proportion of red cherry. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

MOSCHUS

(Mosch.)

Musk

Musk is the sac containing the dried secretion from the preputial follicle of *Moschus moschiferus* Linn. (Order Ungulata), a small deer

inhabiting the mountainous regions of Northern India, Central Asia and parts of Siberia. The sac is situated immediately in front of the preputial orifice of the adult animal. In the fresh state the secretion is fluid, but after the animal has been killed the secretion gradually becomes solid, dark reddish-brown and granular. The sacs are cut from the animals, trimmed and dried, and are then known as "pods." They are packed in boxes, caddies or trays, in which they are exported, principally from China.

Musk varies with the district of origin, the most important varieties are Tonquin and Yunnan from China, Cabardine from Siberia and Northern China and Nepal and Assam from the provinces of those names. *Tonquin* musk is considered the best variety; the pods, which contain about 66 per cent. of grain musk, are about 4·5 to 6·5 centimetres in diameter, about 2 centimetres thick, and weigh from 25 to 35 grammes each; they are approximately hemispherical on one side, and almost flat or slightly convex on the other. The hemispherical side, which is covered with the hide of the animal, bears numerous brownish or brownish-white, short hairs surrounding a small, nearly central orifice. The skin of the opposite side is thinner, dark brown, and composed of several thin layers; the outer layers are sometimes removed, leaving only a very thin, steel-blue skin ("blue skin musk"). *Yunnan* musk pods are pear-shaped or nearly spherical. *Cabardine* musk pods are more oval, flatter and more hairy than those of the Tonquin variety; they are usually more moist, have a strong, ammoniacal odour, and are of inferior quality. *Nepal* and *Assam* musks are in small spherical pods with longer hairs, and are inferior in quality.

Grain musk (Moschus in grano) is the dry, granular secretion from the musk pods. It is a dark-brown, coarsely granular powder, which loses, when dried at 100°, from about 20 to 30 per cent. of its weight, and when dried over sulphuric acid, from about 10 to 15 per cent. of its weight. It yields to alcohol (90 per cent.) from 10 to 20 per cent. of non-volatile extractive, and to water, 50 to 75 per cent. of extractive. The ash contains only a slight trace of iron, and does not exceed about 8 per cent. The odour is strong, very persistent, and characteristic, and the taste is slightly bitter. Grain musk owes its odour to two ketonic bodies, muskone, 0·5 to 2 per cent., and a second ketone which has not yet been investigated. Resin, fat and protein are also present.

Action and Uses.—Grain musk was formerly regarded as a powerful stimulant to the medulla, and good results have been claimed from its use in cases of collapse. There is, however, no evidence to show that it has any action other than that due to its odour. It has been used in the treatment of hysteria, hiccough and other nervous manifestations, also in spasmodic asthma and as a stimulant in typhoid fever, pneumonia and bronchitis; the addition of camphor is an advantage. Grain musk is best **administered** in the form of a cachet, the drug being triturated with lactose; an emulsion may be prepared by

triturating it with an equal quantity of acacia and sucrose, and adding water, or pills may be made by adding a little acacia and massing with syrup of liquid glucose. Grain musk is sometimes given in the form of tincture (Tinctura Moschi, 1 in 20; dose, ½ to 1 fluid drachm). It is largely used in perfumery as a fixative.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

ARTIFICIAL MUSKS are synthetic, yellowish-white, crystalline compounds, which are now obtainable in a chemically pure state. They are insoluble in water, sparingly soluble (1 to 2 per cent.) in alcohol (95 per cent.), soluble in essential oils, benzyl alcohol, benzyl benzoate and ethyl phthalate. They are stable to caustic alkalis, but discolour when exposed to sunlight. They have very strong and persistent odours somewhat similar to, but distinct from, that of natural musk. Musk xylene is trinitro-*tert.*-butyl-*m*-xylene, $C_6(CH_3)_2(C_4H_9)(NO_2)_3$; it occurs in two crystalline modifications, a stable form, melting-point, 113 to 114°, and a labile form, melting-point, 106°. It may on first melting exhibit an indefinite melting-point owing to the simultaneous presence of the stable and labile forms; if the melted material is allowed to resolidify, the stable modification is produced. Musk ketone is dinitro-*tert.*-butyl-*m*-xylylmethylketone, $C_6(CH_3)_2(C_4H_9)(CO\,CH_3)(NO_2)_2$; melting-point, 135° to 136°. Its odour is not as strong as that of musk xylene but has a closer resemblance to that of natural musk. Musk ambrette is dinitro-*tert.*-butyl-*m*-cresylmethylether, $C_6H(C_4H_9)(CH_3)(O{\cdot}CH_3)(NO_2)_2$; melting-point, 85°. Its odour is considered to be the finest of all the artificial musks. Other varieties of artificial musk are aldehyde musk, cyano musk and azimido musk, but they are seldom used. Artificial musks are used in perfumery as substitutes for grain musk but are usually regarded as inferior to the natural substance.

MUCUNA
(Mucun.)

Cowhage

Synonym—Cowitch.

Cowhage consists of the hairs which cover the fruit of *Mucuna pruriens* DC. (Fam. Leguminosæ), a climbing plant growing in tropical Africa, India and America.

Cowhage occurs as a loose, yellowish-brown, felted mass of hairs, intermingled with occasional black fragments of the pericarp. The hairs are from 1 to 2·5 millimetres long, unicellular and sharply pointed, with moderately thick, lignified walls, and numerous, minute and often recurved, cuticular prominences. They are about 60 microns in diameter at the base, above which they are slightly constricted, and then widen to about 100 microns at the middle of the hair, finally tapering to an acute apex.

Action and Use.—Cowhage, mixed with honey or treacle, has been employed as a vermifuge.

Dose.– 0·6 to 4 grammes (10 to 60 grains).

MYLABRIS
(Mylab.)
Mylabris

Synonyms—Chinese Blistering Beetle; Chinese Cantharides.

Mylabris consists of the dried beetles, *Mylabris sidæ* Fab. and *M. cichorii* Linn., which are abundant in China and Eastern India, and *M. pustulata* Thunb., which is widely distributed in India (Fam. Meloidæ; Order Coleoptera).

The head is sub-globular, and bears black antennæ with eleven joints, arcuate and enlarged at the end; the mandibles, which have numerous, needle-like teeth on the projecting convex base of the inner surface, are dissimilar, in that the right mandible has a well-developed tooth on the inner margin just behind the tip, whilst the left mandible is without such a tooth; the elytra are black, and are marked by spots and bands, which are orange-yellow or bright red; the remainder of the body is black. *M. sidæ* is about 15 to 30 millimetres long and 5 to 10 millimetres wide, the yellow bands, as well as the black ground of the elytra, carrying stiff, black hairs; *M. cichorii* is about 12 to 20 millimetres long and 3 to 6 millimetres wide, the yellow bands of the elytra showing a yellow pubescence, while black hairs are present upon the black ground; *M. pustulata* is about 28 millimetres long and 10 millimetres wide, the spots and bands on the elytra being bright red. *Mylabris sidæ* and *M. cichorii* contain from 1 to 1·2 per cent., and *M. pustulata* up to 2·3 per cent., of cantharidin. The drug also contains fat and an odorous principle. The ash averages about 6·5 per cent., and the volatile matter at 100° about 13·5 per cent.

Action and Uses.—Mylabris is used as a source of cantharidin, and in India and the Eastern Colonies as a substitute for cantharides.

MYRICA
(Myric.)
Bayberry

Synonyms—Wax Myrtle Bark; Bayberry Bark.

Bayberry consists of the dried bark of the root of *Myrica cerifera* Linn. (Fam. Myricaceæ), a shrub growing commonly in the coastal region of North America from New Jersey to Florida. It should be **stored** in air-tight containers and protected from light.

The bark occurs in quilled pieces or curved strips, 2 to 15 centimetres long, 0·5 to 2 centimetres broad, and 1 to 2 millimetres thick; the outer surface is whitish to silvery-grey, except where cork is removed, when it is reddish-brown, smooth or transversely wrinkled, and bears scattered, rounded root-scars; the inner surface is dark brown, and finely striated longitudinally. The fracture is short, granular or

slightly fibrous. A smoothed transverse section is light brown in the outer portion and yellowish-brown in the inner portion, where groups of bast fibres are scattered between the medullary rays. The odour is distinct and aromatic; the taste is slightly bitter and astringent, becoming pungent and acrid.

The diagnostic **microscopical** features are fibres, accompanied by files of rectangular cells containing prismatic crystals of calcium oxalate; groups of stone cells; starch grains, either simple or 2 to 3 compound, individual grains being up to 12 microns in diameter; patches of thick-walled parenchyma, the cells being filled with a yellowish-brown substance, termed "gummy lignin."

Bayberry **contains** a little volatile oil, starch, gum, albumin, a red colouring matter, tannic and gallic acids, and an acrid, astringent resin. It also contains an acidic substance which has been named myricinic acid. It yields to cold water about 15 per cent. of extractive.

Standard.—Bayberry yields not more than 2 per cent. of acid-insoluble ash.

Bayberry, in powder (Pulvis Myricæ; Pulv. Myric.), contains the constituents and possesses the diagnostic microscopical characters, of Myrica, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Bayberry is tonic and astringent, and in large doses it may be emetic. It may be **administered** in the form of infusion or liquid extract. The powdered bark, mixed with ginger, capsicum and clove in varying proportions, is used under the name of composition powder as a domestic remedy for colds and chills.

Dose.– 0·6 to 4 grammes (10 to 60 grains).

MYRISTICA

(Myrist.)

Nutmeg

Synonyms—Nux Moschata; Myristicæ Semen.

Nutmeg consists of the dried kernels of the seeds of *Myristica fragrans* Houtt. (Fam. Myristicaceæ), a tree indigenous to the Moluccas and cultivated in Penang, Sumatra, the East Indies, etc. The seed is divested of the arillus (mace) and slowly dried, an operation which takes from eight to ten weeks; the testa is then broken and the kernel removed.

The kernels are ovoid in shape, about 2 to 2·5 centimetres long and 1·5 to 2 centimetres broad; the surface is light brown, shows a network of shallow, reticulate grooves, and is marked with numerous small, dark brown points and lines. The hilum is indicated by a slight circular elevation, about 5 millimetres in diameter, somewhat eccentrically placed at the wider end, and connected by a broad, shallow

groove with the chalaza which has the form of a slight circular depression at the opposite end. The kernel consists of a pale brown endosperm covered by a thin, darker-brown perisperm, which penetrates the endosperm by numerous infoldings, producing the characteristic ruminate appearance of the section; the small embryo is found embedded in the endosperm just within the hilum. When pressed by the finger-nail, the cut surface exudes oil. The odour is aromatic and characteristic; the taste is aromatic and somewhat bitter.

The diagnostic **microscopical** characters are the inner, ruminate portion of the perisperm, consisting of an outer brown layer and an inner parenchyma, containing isolated or grouped, yellow oil cells; the polygonal cells of the endosperm, each containing a single aleurone grain with a large crystalloid, about 12 by 20 microns, and starch grains, 2 to 10 compound or simple, the latter being up to about 20 microns in width, all frequently embedded in a dark brown, fatty mass.

Nutmeg **contains** from 5 to 15 per cent. of volatile oil and about 35 per cent. of solid fat. The fatty acids consist mainly of myristic acid (about 61 per cent.), with smaller amounts of palmitic, oleic, linoleic and lauric acids. The ash is about 3 per cent., and the acid-insoluble ash about 0·15 per cent.

Substitutes and Adulterants.—Bombay nutmegs, from *Myristica malabarica* Lam., are longer, narrower and nearly devoid of odour. Macassar or Papua nutmegs, from *M. argentea* Warb., are also longer and narrower and have a uniform, scurfy surface and an acrid taste. Limed nutmegs are nutmegs which have been dipped in milk of lime and subsequently dried, a process which is intended to protect them from the attacks of insects. Factitious nutmegs are sometimes made from damaged nutmegs mixed with clay and pressed into moulds; they yield a small amount of volatile oil and have a high ash.

Standard, B.P.—Nutmeg consists only of the dried kernels of *Myristica fragrans*.

Nutmeg, in powder (Pulvis Myristicæ : Pulv. Myrist.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Nutmeg is aromatic and carminative by virtue of its volatile oil. In large doses, it excites the motor cortex and produces a species of epileptiform convulsions. It is **administered** in the form of powder, or, more usually, as the volatile oil.

Dose.—0·3 to 0·6 gramme (5 to 10 grains).

MYROBALANUM
(Myrobal.)
Myrobalan

Synonym—Black Chebulic Myrobalans.

Myrobalan consists of the dried, immature fruits of *Terminalia Chebula* Retz. (Fam. Combretaceæ), a tree indigenous to India.

The fruits are black in colour, ovoid or fusiform in shape, about 10 to 30 millimetres long and 5 to 15 millimetres wide. They are much shrivelled longitudinally, hard and brittle; the fractured surface is shiny, and when broken, the fruits often show a central cavity. The drug is without odour but has a very astringent taste. It **contains** from 20 to 40 per cent. of tannin and a greenish oleoresin.

Substitute.—The mature fruits, which are commonly imported for use in various technical processes, are larger and yellowish-brown in colour.

Action and Uses.—Myrobalan is used as an equivalent of gall in India and the Eastern Colonies. Unguentum Myrobalani and Unguentum Myrobalani cum Opio correspond to Unguentum Gallæ and Unguentum Gallæ cum Opio, but are prepared with myrobalan instead of gall. The mature fruit is employed extensively for tanning.

MYRRHA
(Myrrh.)
Myrrh

Myrrh is an oleo-gum-resin obtained from the stem of *Commiphora molmol* Engl. and possibly other species of *Commiphora* (Fam. Burseraceæ), shrubs or small trees growing in North-Eastern Africa and Southern Arabia. The oleo-gum-resin is secreted in numerous schizogenous ducts, which form lysigenous cavities by the breaking down of intervening tissue and become filled with the secretion. This is obtained by wounding the bark, or is exuded through natural fissures. It is yellowish-white and fluid at first, but soon hardens to a reddish-brown mass. It is exported from the coast of Somaliland.

Myrrh occurs in rounded or irregular tears, or in masses of agglutinated tears. Externally, it is reddish-brown or reddish-yellow in colour, dry, and often covered with a fine dust. It breaks with a brittle fracture, exhibiting a granular, somewhat translucent surface, which is oily and of a rich brown colour, and frequently exhibits whitish spots or veins. Myrrh may be identified by triturating it with five times its weight of sand, and shaking the resulting powder with ether; when the filtered ethereal solution is allowed to evaporate from a porcelain dish so as to leave a thin film, a violet colour is produced when the film is exposed to bromine vapour. The drug has an agreeable, aromatic odour, and an aromatic, bitter and acrid taste.

Myrrh **contains** 25 to 40 per cent. of resin, 57 to 61 per cent. of gum, 2·5 to 8 per cent. of volatile oil, a bitter principle, and 3 to 4 per cent. of impurities. That portion of the resin which is soluble in ether contains three free resin acids, namely, α-, β- and γ- commiphoric acids, the esters of a resin acid, commiphorinic acid and two phenolic resins, α- and β-heerabomyrrhol. From the resin insoluble in ether, two other acids, α- and β-heerabomyrrholic acids, have

been obtained. These constituents show little analogy with the substances that have been isolated from other resins. The volatile oil is yellow, and rapidly resinifies when exposed to the air, producing resin similar to that contained in the myrrh itself; it contains eugenol, *m*-cresol, cuminaldehyde, free formic and acetic acids, myrrholic acid (an isomeride of α-commiphoric acid) in the form of an ester, and the sesquiterpene, heerabolene. Both volatile oil and resin yield the same characteristic violet reaction with bromine vapour. The gum is apparently allied to acacia and, like it, is associated with an oxidase.

Substitutes and Adulterants.—Fahdli or Arabian myrrh occurs in small masses of agglutinated tears with a less dusty surface and free from whitish markings on the fractured surface. It is less bitter in taste and also less fragrant than genuine Somali myrrh. Yemen myrrh occurs in large dusty pieces. It does not exhibit whitish streaks and does not exude oil when pressed with the finger-nail, and is less aromatic than myrrh. Perfumed bdellium or bissabol closely resembles myrrh. It breaks with a waxy fracture and gives an oily exudate when pressed with the finger-nail. The whitish markings on the fractured surface are traversed by brown resin patches. It differs from myrrh both in odour and taste and does not respond to the colour test; it is probably obtained from *C. erythræa* var. *glabrescens* Engl. Opaque bdellium is a very hard, yellowish-brown, opaque gum-resin with a slight odour and a bitter taste. African bdellium occurs in hard pieces, translucent in thin layers and breaking with a dull slaty fracture; it has a bitter taste and an odour recalling that of pepper. Indian bdellium occurs in irregular, reddish-brown masses. The fractured surface is hard and, like the outer surface, covered with minute, shiny points of resin. It has a feebly cedar-like odour which is developed on keeping and an acrid but not bitter taste. Gum hotai occurs in liver-coloured, opaque masses. It contains an acid resin and a saponin, and is used for washing the hair. Finely powdered myrrh does not represent the official drug; it is deficient in volatile oil and may yield as much as 13 per cent. of ash.

Standard, B.P.—Myrrh contains not more than 4 per cent. of foreign organic matter. Ash, not more than 9 per cent. Matter insoluble in alcohol (90 per cent.), not more than 70 per cent.

Action and Uses.—Myrrh is mildly disinfectant, and is a local stimulant to the mucous membranes. Internally, like the other resins, it is carminative and, during excretion, acts as a mild, stimulating expectorant, diaphoretic and diuretic. Tincture of myrrh and tincture of myrrh with borax are used for mouth-washes and gargles in ulcerated or relaxed throat, aphthous stomatitis and spongy gums.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Pilulæ Aloes et Myrrhæ, B.P.C.—(Pil. Aloes et Myrrh.)—Aloes and Myrrh Pills. *Syn.*—Pilulæ Rufi; Rufus Pills. Each pill contains 2 grains of aloes and 1 grain of myrrh. Dose.– 1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914.

Tinctura Aloes et Myrrhæ, B.P.C.—(Tinct. Aloes et Myrrh.)—Tincture of Aloes and Myrrh. *Syn.*—Elixir Proprietatis. Aloes, 1 in 10, and saffron, in tincture of myrrh. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Tinctura Myrrhæ, B.P.—(Tinct. Myrrh.)—Tincture of Myrrh. 1 in 5, by maceration with alcohol (90 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tinctura Myrrhæ Composita, B.P.C.—(Tinct. Myrrh. Co.)—Compound Tincture of Myrrh. *Syn.*—Tinctura Myrrhæ et Aloes. Myrrh and aloes, of each about 1 in 20.

Tinctura Myrrhæ et Boracis, B.P.C.—(Tinct. Myrrh. et Borac.)—Tincture of Myrrh and Borax. Tincture of myrrh, about 1 in 3, with tincture of krameria, oils of bergamot, lemon, orange, neroli and rosemary, and borax.

NAPHTHALENI TETRACHLORIDUM

(Naphthalen. Tetrachlor.)

Naphthalene Tetrachloride

$C_{10}H_8Cl_4 = 269{\cdot}9$

Naphthalene tetrachloride is the addition product of naphthalene prepared by the action of chlorine on naphthalene until absorption is complete. The mixture of chlorinated compounds is extracted successively with light petroleum and alcohol, and the residue is crystallised from chloroform. It forms a white, odourless, crystalline powder.

Insoluble in water; slightly soluble in alcohol and ether; more soluble in chloroform.

Standard.—Naphthalene tetrachloride melts between 185° and 187°. Ash, not more than 0·1 per cent.

Action and Uses.—Naphthalene tetrachloride is administered in cachets, capsules, or pills for the same purposes as naphthalene.

Dose.—0·2 to 0·8 gramme (3 to 12 grains).

NAPHTHALENUM

(Naphthalen.)

Naphthalene

$C_{10}H_8 = 128{\cdot}1$

Naphthalene is a hydrocarbon obtained by the fractional distillation of coal tar; it is present in large quantity in the fraction obtained between 170° and 230°, from which on cooling it separates in crystals. These crystals are freed from liquid by straining and pressing, washed successively with caustic soda solution and sulphuric acid, and finally purified by sublimation. It occurs in colourless, transparent, crystalline or micaceous scales, having a characteristic, tar-like odour, and a sharp, aromatic taste. Specific gravity, about 1·15; boiling-point, about 218°. It volatilises slowly on exposure to the air, and rapidly when heated, and sublimes much below its melting-point. It burns with a smoky, luminous flame.

Insoluble in water; soluble in alcohol (1 in 23), ether (1 in 3) and chloroform (1 in 1·5).

Standard.—Naphthalene melts between 79° and 80°. Ash, not more than 0·05 per cent. A 2 per cent. w/v alcoholic solution is neutral to litmus. 1 gramme heated with sulphuric acid yields a solution with not more than a faint pink colour. When 1 gramme is boiled with 1 millilitre of sodium hydroxide solution and 10 millilitres of water, and the filtrate acidified with hydrochloric acid, no colour is formed on adding 1 drop of ferric chloride solution (absence of phenolic bodies).

Action and Uses.—Naphthalene has been employed as an antiseptic, but some doubt has been expressed as to whether it has itself such properties, or whether its antiseptic effects are due to the formation of naphthols. Its action closely resembles that of the naphthols, which are generally employed in preference. Naphthalene has been used as an intestinal disinfectant and in the treatment of diarrhœa. It is a vermifuge for both tape- and round-worms. Its toxicity is low because very little is absorbed. Large doses are liable to produce a form of parenchymatous nephritis. Externally, it is used in the form of an ointment (10 per cent.), and a solution of a similar strength in olive oil is used as a parasiticide in scabies and to destroy pediculi. Naphthalene is best **administered** in cachets or capsules. It is also prepared in the form of balls and tablets for keeping away moths from articles of clothing.

Dose.—0·2 to 0·8 gramme (3 to 12 grains).

ÆTHYLIS PHTHALAS.—Ethyl phthalate, $C_6H_4(COOC_2H_5)_2$, or diethyl phthalate, is a colourless, odourless liquid, having a specific gravity of about 1·12 and a boiling-range of 290° to 300°. It is miscible with oils and aromatic hydrocarbons, partly miscible with petroleums, and immiscible with water. It is used as a solvent and plasticiser in the manufacture of lacquers and varnishes, and also as a denaturant for alcohol.

AMYLIS PHTHALAS.—Amyl phthalate, $C_6H_4(COOC_5H_{11})_2$, may be obtained by the esterification of amyl alcohol with phthalic acid and occurs as an almost colourless and odourless liquid, having a specific gravity of about 1·026 and a boiling-range of 336° to 342°. It is miscible with oils and hydrocarbons but not with water, and is used as a solvent in the manufacture of lacquers and varnishes.

BUTYLIS PHTHALAS.—Butyl phthalate, $C_6H_4(COOC_4H_9)_2$, is prepared by the action of butyl alcohol on phthalic anhydride. It has a specific gravity of about 1·05 and boils at about 325°. It is immiscible with water, but mixes readily with oils and hydrocarbons, and is used extensively as a plasticiser and solvent in the manufacture of lacquers and varnishes.

NARCOTINA

(Narcotin.)

Narcotine

$C_{22}H_{23}O_7N = 413·2$

Narcotine, $C_{19}H_{14}O_4N(OCH_3)_3$, is an alkaloid obtained from opium,

in which it exists to the extent of from 2 to 10 per cent., for the most part in the free state. It may be obtained directly from opium by extraction with ether, or by digesting with dilute hydrochloric acid the residue left after exhausting opium with water; this solution is precipitated with sodium carbonate, the precipitate obtained boiled with alcohol, and the alcoholic solution concentrated and allowed to crystallise. It occurs in the form of colourless, odourless, tasteless, shining, rhombic prisms, or long needles. Its acid solutions taste bitter and are dextrorotatory; solutions in alchohol or chloroform are lævorotatory. In concentrated sulphuric acid, the alkaloid dissolves, forming a greenish-yellow solution which, on warming, becomes red, and on boiling, violet. Nitric acid produces a yellow-coloured solution. Sulphuric acid containing a trace of nitric acid produces a blood-red colour. The alkaloid, dissolved in dilute mineral acid, is almost completely precipitated by the addition of excess of sodium acetate.

Insoluble in water; soluble in ether, boiling alcohol, ethyl acetate and chloroform; soluble to some extent in benzene (distinction from morphine, which is quite insoluble); soluble in dilute mineral acids; insoluble in cold, but soluble in boiling solutions of alkalis.

Standard.—Narcotine melts between 175° and 176°. Ash, not more than 0·1 per cent.

Action and Uses.—Narcotine has at first a mildly depressant action upon the cerebral hemispheres. Its effect is similar to that of morphine on the sensory cells but is much less marked; this action is followed by exaggerated reflexes due to stimulation of the spinal cord, resulting in restlessness and tremors. Like papaverine, it relaxes the tone of plain muscle, especially when this is tonically contracted. It is much less poisonous than either morphine or codeine.

Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

NEOARSPHENAMINA

(Neoarsphenamin.)

Neoarsphenamine

Synonyms—Novarsenobenzol; Novarsenobenzene.

Neoarsphenamine consists mainly of sodium 3 : 3′-diamino-4 : 4′-dihydroxyarsenobenzene - N - methylenesulphoxylate, $(NH_2)(OH)C_6H_3As : AsC_6H_3(OH)(NH{\cdot}CH_2{\cdot}O{\cdot}SO\,Na)$. This compound is the sodium salt of an acid differing from the principal constituent of arsphenamine in the replacement of one hydrogen atom of an amino-group by a methylenesulphinic group, the replacement being effected by treatment with sodium formaldehydesulphoxylate.

Neoarsphenamine occurs as a dry, yellow powder, freely mobile in contact with glass surfaces, and without odour except that due to traces of ether or alcohol. It is distributed in sealed glass phials from which the air has been evacuated or replaced by an inert gas. It contains, when determined by an approved method, not less than 18 per cent. and not more than 21 per cent. of As. The proportion of arsenic may be determined by the method given under Sodii Aminarsonas. The aqueous solution is neutral or slightly alkaline to litmus, and decolourises solution of iodine. On the addition of hydrochloric acid to the aqueous solution, a yellow precipitate of the free acid is produced, and when the mixture is warmed, sulphur dioxide is evolved and gives a blue colour with starch-iodate paper. When 10 millilitres of a 2 per cent. w/v aqueous solution acidified with phosphoric acid is distilled until about 5 millilitres of distillate has been collected, the distillate contains formaldehyde, which may be detected by adding 5 drops of a 1 per cent. w/v aqueous solution of phenol and running a layer of sulphuric acid under the mixture, when a red ring is produced at the zone of contact. Neoarsphenamine should be **stored** at a temperature below 15°. If it has become darker in colour it should not be used.

Soluble in water; insoluble in dehydrated alcohol and ether.

Standard, B.P.—Neoarsphenamine is controlled by regulations made under the Therapeutic Substances Act, 1925. The standard preparation for Great Britain and Northern Ireland is a quantity of neoarsphenamine kept in the National Institute for Medical Research, London. It complies with biological tests, carried out in an institution or laboratory approved by the licensing authority, for maximum toxicity and therapeutic potency. When 0·6 gramme of the powder is added to 1 millilitre of distilled water, it dissolves rapidly and completely, yielding a clear, yellow solution free from suspended particles. No precipitate is produced on shaking a 10 per cent. w/v aqueous solution with an equal volume of N/1 sodium carbonate (absence of arsphenamine). When kept in sealed phials, at a temperature of 56° for not less than twenty-four hours, the product retains its colour, physical properties and solubility.

Action and Uses.—Neoarsphenamine is the most efficient derivative of arsphenamine. It has the advantages of being less toxic, more readily soluble, and of not requiring to be neutralised. On the other hand, it is less active therapeutically. Neoarsphenamine is now used almost to the exclusion of arsphenamine. In general, the treatment **administered** to a case of early syphilis consists of a number of courses of intravenous injections of neoarsphenamine in conjunction with mercury or bismuth preparations, which may be given at the same time or in the intervals between arsenical courses. In each course the single dose of neoarsphenamine for a man of average weight, and presenting no contra-indication, increases from 0·45 to 0·75 gramme (7 to 12 grains). A dose of 0·45 gramme (7 grains) should cause *Sp. pallida* to disappear from the secretion of chancres or early secondary lesions in twenty-four hours. The number of injections per course varies from seven to ten, and the

intervals between courses from six weeks to two or three months. The number of courses is three or more, depending largely on the effect on the Wassermann and other serum reactions. If these are negative at the end of the first course, two or three more courses may be considered sufficient. If the serum reactions persist, the treatment is prolonged considerably. After the treatment has been completed, the patient is kept under observation for a minimum period of two years, during which time the blood is tested periodically, and the cerebrospinal fluid once or more often. When, for any reason, intravenous injections are impracticable, and sometimes as a matter of preference in the first instance, the arsphenamine preparation is given intramuscularly or into the areolar tissue overlying the muscle fascia in the gluteal region. In this case the preparation of choice is sulpharsphenamine, which causes far less discomfort than does neoarsphenamine administered by this route. Sometimes silver arsphenamine is still given to early cases, but usually it is reserved for syphilis of the central nervous system.

In cases with infections of longer standing, the serum reactions are not influenced, and some syphilologists content themselves with giving one or two courses, after which they place the patient under surveillance. Others persist in treatment for a number of years on the principle that the positive reactions mean living *Sp. pallida* somewhere in the body, and that the persistent treatment is an insurance against their causing damage to vital structures. In late syphilis of the nervous system, especially in tabes and general paresis, although the arsphenamines are greatly used, and especially perhaps sulpharsphenamine and silver arsphenamine, greater reliance is placed on tryparsone, which is given in courses of ten or more weekly injections, each of 2 to 3 grammes (30 to 45 grains), often in conjunction with injections of bismuth (see Tryparsonum). If this fails, it is usual to inoculate with malaria or recurrent fever, or to produce a series of pyrexial paroxysms by injections of such agents as sulphur in oil or Vaccinum Typho-paratyphosum. The pyrexial method has revolutionised the treatment of general paresis, completely altering the outlook in this hitherto hopeless form of syphilis. There is no evidence pathologically that a syphilitic patient ever becomes free from spirochætes.

Solutions of neoarsphenamine for intravenous use are prepared by dissolving up to 0·3 gramme (5 grains) in 5 millilitres (75 minims) of cold sterilised water, or larger doses in 10 millilitres (150 minims). Intramuscular injections are painful, but the pain may be reduced by dissolving the neoarsphenamine in guaiacol-dextrose solution (guaiacol 1 part, dextrose, 50 parts, recently sterilised water, to 100 parts), but for this route sulpharsphenamine is preferred. Shortly after the introduction of the arsphenamines in the treatment of syphilis, toxic manifestations were observed. So various have been these ill-effects that no thoroughly satisfactory method of classification is possible. The following constitute the majority of recorded disturbances: (1) Immediate reactions, for example diarrhœa, vomiting, pyrexia, headache, and the vasomotor or so-called anaphylactoid effects. (2) Effects involving

the nervous system, "encephalitis hæmorrhagica." (3) Effects involving the liver: clinically these may be grouped as: (a) early jaundice, usually mild and evanescent; (b) late jaundice, sometimes occurring several weeks after the end of a course of treatment; (c) acute yellow atrophy. (4) Exfoliative dermatitis. (5) Various rare lesions, acute hæmorrhagic nephritis, purpura hæmorrhagica, aplastic anæmia. (6) Complications now regarded as relapses of the disease, or as due to temporary stimulation of the activity of the spirochætes. The first of these include such affections of the nervous system as cranial nerve palsies. In addition, accidents may occur due to faulty injection, such as perivascular infiltration and necrosis at the site of injection, thrombosis, or phlebitis.

In the prophylaxis of the toxic effects the following precautions should be taken. The general health of the patient should be studied; cachexia, diabetes, nephritis and cardiac lesions call for increased caution. The patient must be carefully prepared, the bowels should be opened, and no food taken for two hours before injection. A full diet containing sufficient protein and fat appears to be the best from the point of view of preventing damage to the liver. In the actual treatment of toxic manifestations, adrenaline or ephedrine is given for the immediate reactions, whilst sodium thiosulphate is administered subcutaneously or intravenously for the later complications, especially dermatitis. There is strong evidence that in dermatoses resulting from treatment with preparations of arsphenamine liver extract is curative. This is based on the view that liver disturbance is at the root of the skin trouble. Intravenous injection of 25 millilitres (375 minims) of 20 per cent. w/v solution of dextrose on alternate days is also recommended. Neoarsphenamine has been used in the treatment of a large number of diseases. It is of value in septicæmia, malaria, relapsing fever, rat-bite fever, Vincent's angina (local application) and yaws. Neoarsphenamine which has become darker in colour should not be used. Solutions for **injection** may be prepared by dissolving the contents of a sealed container in the required quantity of sterile, freshly-distilled water, and used immediately.

Dose.– 0·15 to 0·9 gramme (2½ to 14 grains), by intravenous injection.

NICOTINA

(Nicotin.)

Nicotine

$C_{10}H_{14}N_2 = 162{\cdot}1$

Nicotine is a liquid alkaloid which exists chiefly as malate in the leaves of *Nicotiana Tabacum* Linn. (Fam. Solanaceæ), the dried

Virginian leaf sometimes containing as much as 7 per cent. It may be obtained by digesting the leaves in acidified water, evaporating to a small bulk, distilling with excess of potassium hydroxide, shaking the distillate with ether, distilling the ethereal solution, and placing the residual nicotine in contact with quicklime to remove water, and finally distilling it in a current of hydrogen. It occurs as a very hydroscopic, colourless or yellowish oily liquid, having an unpleasant, pungent and acrid odour of stale, burnt tobacco. It gradually becomes brown in contact with the air, and is inflammable. In very dilute, aqueous solution it has a sharp, burning and persistent taste. The free base is lævorotatory, the salts dextrorotatory. Its aqueous solution is alkaline and turns red litmus blue, but does not redden phenolphthalein. It remains liquid at −10°, and volatilises readily and without decomposition in a current of steam. Potassium hydroxide separates it from its aqueous solution. Chlorine colours it brown to blood-red. It is precipitated by most of the usual alkaloidal reagents. Oxidation with chromic acid mixture yields nicotinic acid, and this, when distilled with lime, yields pyridine. In the absence of any other free base, nicotine can be determined by titration with standard acid, using solution of litmus as indicator. Pure nicotine boils at about 240° to 246°, and has a specific gravity of about 1·01 at 20°. Optical rotation at 20°, 159° to 168°. Refractive index at 20°, about 1·52.

Freely **soluble** in water, alcohol, ether, light petroleum, terpenes and fixed oils.

Action and Uses.—Nicotine first stimulates nerve cells and then paralyses them. It, therefore, at first raises blood pressure and later diminishes it. The paralysing action also results in a quicker heart, dilated bronchioles, and more active peristalsis, the latter from depression of the inhibitory fibres of the sympathetic. Nicotine is not used in medicine. Preparations of nicotine are largely employed in horticulture as insecticides, usually by spray or vaporisation; sprays suitable for general use may contain 1 part of crude nicotine with 10 to 20 parts of soft soap in 2000 parts of water. In using them, precautions should be taken against absorption by contact with the skin. It is an extremely poisonous substance, and large doses may prove fatal within a few minutes, the symptoms being those of sudden paralysis of the central nervous system, including the respiratory centre. In cases of **poisoning** by nicotine, the stomach should be evacuated, and repeated doses of tannic acid given. The patient must be kept warm in bed, and the medulla kept active by such stimulants as caffeine, atropine and strychnine; but if there are signs of respiratory failure, artificial respiration with oxygen must be resorted to immediately.

NICOTINÆ SALICYLAS.—Nicotine salicylate has been used in 0·1 per cent. solution or ointment as a parasiticide, particularly in scabies.

NICOTINÆ SULPHAS.—Nicotine sulphate has been given by injection in post-encephalitic conditions, in doses of 0·001 gramme (1/60 grain).

NITROBENZENUM
(Nitrobenz.)

Nitrobenzene

$C_6H_5O_2N = 123{\cdot}0$

Synonym—Oil of Mirbane.

Nitrobenzene, $C_6H_5NO_2$, may be prepared by treating benzene with a mixture of nitric and sulphuric acids, first at a temperature of 25° to 30° and finally at 70° to 90°, washing the product with weak solution of alkali, and distilling in a current of steam. It occurs as a pale yellow, highly refractive oily liquid, having a very sweet taste and an odour of bitter almond. It solidifies at a low temperature to acicular crystals melting at about 5°, and readily volatilises with steam. It distils between 209° and 211°. Specific gravity, about 1·21. It is reduced by acid reducing agents to aniline; by alkaline agents to azoxy-, azo-, and hydrazobenzene; by neutral agents to nitrosobenzene and phenylhydroxylamine.

Almost **insoluble** in water; miscible with alcohol, ether and benzene.

Action and Uses.—Nitrobenzene is a powerful poison, causing great muscular weakness, a cyanotic colour of the skin, and rapid paralysis of the respiratory centre. These effects are due in part to methæmoglobin formation, and in part to central nervous action. The fumes of nitrobenzene must not be inhaled, neither must the pure substance be allowed to come in contact with the skin. It is not used in medicine, but is largely employed as an intermediate in the synthesis of benzene derivatives, and as an insect repellant. In cases of **poisoning,** the stomach should be evacuated, cerebral stimulants given internally, and strychnine injected hypodermically; artificial respiration must be employed, if necessary. In those engaged in trades in which nitrobenzene is used, it is extremely difficult to determine the early stages of poisoning, since it is not possible to detect methæmoglobin until from 5 to 10 per cent. is present in the blood.

NITROGENII MONOXIDUM
(Nitrogen. Monox.)

Nitrous Oxide

$N_2O = 44{\cdot}02$

Nitrous oxide may be prepared by heating ammonium nitrate, and is supplied compressed in metal cylinders. It occurs as a colourless gas, with a characteristic odour and a faintly sweetish taste; it is heavier than air. It supports combustion, and a glowing splinter of wood inflames on being plunged into the gas. The gas may be distinguished from oxygen by the absence of red fumes on mixing it with nitric oxide. Nitrous oxide is sometimes known as "laughing gas."

Soluble in water (about 1 in 2 by volume, between 15° and 25°).

Standard, B.P.—Nitrous oxide, drawn from a cylinder in the upright position, contains not less than 93 per cent. v/v of N_2O. Carbon monoxide limit, determined on the first portion of gas drawn from a cylinder in the upright position, 50 parts per million v/v. It complies also with tests for the absence of halides and sulphuretted hydrogen, and of arseniuretted hydrogen and phosphoretted hydrogen, and with limit tests for water vapour and carbon dioxide, uncondensable gases, acidity or alkalinity, reducing substances and oxidising substances.

Action and Uses.—Nitrous oxide, administered from an inhaler in the absence of oxygen or air, rapidly enters into the circulation, is absorbed by the plasma, and produces partial asphyxia. The gas acts in two ways; it causes asphyxia, and progressively paralyses the nerve centres, acting as a general anæsthetic. During inhalation of a mixture of nitrous oxide and air, the first stage is marked by subjective sensations followed by loss of control. This stage is succeeded by drowsiness and diminished sensation to pain, and finally complete anæsthesia. Nitrous oxide is the safest anæsthetic known when prolonged anæsthesia is not required. The disadvantage of its use alone is that lack of oxygen produces a sudden rise of blood pressure which may be dangerous. If oxygen is inhaled with nitrous oxide, the asphyxial symptoms are eliminated, but very profound anæsthesia cannot always be obtained without increasing the pressure at which the gases are absorbed or without the previous administration of hypnotics, such as morphine and hyoscine or barbituric acid derivatives. It is employed by inhalation as a general anæsthetic, particularly in dental practice. It is frequently administered to produce a light anæsthesia before the administration of ether, for general anæsthesia in conjunction with oxygen, and sometimes as a vehicle for ether.

NOVAURANTIA

(Novaurant.)

Orange G

$C_{16}H_{10}N_2O_7S_2Na_2 = 452{\cdot}2$

Orange G (Colour Index No. 27) is the disodium salt of benzeneazo-β-naphthol-6 : 8-disulphonic acid, and may be prepared by coupling benzenediazonium chloride with β-naphthol-6 : 8-disulphonic acid and converting the product into the disodium salt. It occurs as a yellowish-red powder or in crystalline leaflets. The colour of the aqueous solution is unaltered on the addition of hydrochloric acid, but becomes yellowish-red on the addition of alkali. Calcium chloride precipitates a crystalline calcium salt, which is readily soluble in hot water but sparingly soluble in cold.

Soluble in water, giving an orange-yellow solution; readily soluble in alcohol.

Standard.—Orange G leaves not less than 36 per cent. and not more than 50 per cent. of sulphated ash. Arsenic limit, 10 parts per million. Lead limit, 50 parts per million. Dissolve the sulphated ash from 1 gramme in 20 millilitres of dilute hydrochloric acid, and add 1 millilitre of potassium ferrocyanide solution; no precipitate is obtained (limit of zinc).

Action and Uses.—Orange G is unaffected by acids and alkalis, or by light, and is a useful orange colouring agent for medicines and foodstuffs. In combination with tartrazine, as in Liquor Tartrazinæ Compositus, it forms a useful substitute for the colouring matter of saffron. The addition of 5 minims of Liquor Tartrazinæ Compositus to each fluid ounce of a colourless liquid imparts a stable, saffron-like colour, equivalent to that produced by 25 minims of glycerin of saffron, or 12½ minims of freshly prepared tincture of saffron. Orange G is also used as a microscopical stain.

Preparation

Liquor Tartrazinæ Compositus, B.P.C.—(Liq. Tartrazin. Co.)—Compound Solution of Tartrazine. *Syn.*—Liquor Flavus. Tartrazine, 0·75 per cent. w/v, and orange G, 0·25 per cent. w/v, in glycerin and chloroform water.

NUX VOMICA
(Nux Vom.)

Nux Vomica

Synonym—Strychni semen I.A.

Nux vomica consists of the dried ripe seeds of *Strychnos Nux-vomica* Linn. (Fam. Loganiaceæ), a small tree widely distributed over India and the Malay Archipelago. The ripe fruit, which externally resembles an orange, contains a whitish, bitter pulp in which are embedded from three to five seeds; the seeds are removed when ripe, washed free from pulp, and dried in the sun.

The seeds are disc-shaped, about 10 to 30 millimetres in diameter and 4 to 6 millimetres thick, hard, usually flat but sometimes irregularly curved, and the edge is rounded or sub-acute. The testa is grey to greenish-grey externally, and possesses a satiny sheen due to the presence of a dense covering of closely appressed hairs radiating from the centre of each flat face. The micropyle is situated on a prominence on the edge, and from it a radial ridge extends to the centrally-placed hilum. The abundant endosperm is horny and translucent, and exhibits a central, thin, disc-shaped hollow in which lie two small, cordate, leafy cotyledons attached to a cylindrical radicle. The drug is odourless, and has an extremely bitter taste.

The diagnostic **microscopical** characters are the epidermal trichomes, having strongly-thickened, pitted and lignified bases and cylindrical limbs up to about 1 millimetre long, and each strengthened by several narrow, longitudinal, lignified ribs, which break up in the powder into small, structureless, rod-like fragments; the colourless, thick-walled, unlignified, polygonal cells of the endosperm, containing an oil-plasma with a few aleurone grains, and exhibiting a well-marked plasmodesma; the absence of starch and crystals of calcium oxalate.

Nux vomica **contains** the alkaloids, strychnine and brucine, together with traces of strychnicine and vomicine and of a glycoside, loganin. It also contains fatty matter (about 3 per cent.), caffeo-tannic acid, and a trace of copper. The total alkaloid present varies from 1·8 to 5·3 per cent. Of this total alkaloid about one-half is strychnine, although this proportion is subject to some variation. The pulp of nux vomica fruit contains about 5 per cent. of loganin, together with strychnicine.

Substitutes.—The seeds of *S. nux-blanda* Hill and those of *S. potatorum* Linn. have been imported as nux vomica; the former closely resemble the official seeds, but may be distinguished by their paler colour, the presence of a distinct ridge on the edge of the seed and the absence of a bitter taste; they contain no strychnine or brucine. The seeds of *S. potatorum* are smaller, thicker and also free from bitterness.

Standard, B.P.—Nux vomica contains not less than 1·2 per cent. of strychnine and not more than 1 per cent. of foreign organic matter.

Nux vomica, in powder, contains the constituents and possesses the diagnostic microscopical characters of Nux Vomica, and complies with the limit for strychnine of the unground drug. When powdered nux vomica is prescribed, the standardised powder, Nux Vomica Pulverata, must be used.

Action and Uses.—The properties of nux vomica are virtually those of the alkaloid strychnine (see Strychnina). Powdered nux vomica is employed in atonic dyspepsia and is **administered** in cachets or capsules, often with bismuth compounds or pepsin. The preparations in common use are the tincture and the dry extract; the tincture is employed in mixtures for its stimulant action on the gastro-intestinal tract. In the mouth, it acts as a bitter, increasing the appetite. In the intestine, it stimulates peristalsis, and is often combined with laxatives, such as cascara sagrada, in chronic constipation due to atony of the bowel. Dry extract of nux vomica is used in pills, in association with purgatives and with ferruginous preparations, in anæmia. In cases of **poisoning** by nux vomica, the antidotes described under Strychnina should be employed.

Preparations

Extractum Nucis Vomicæ Liquidum, B.P.—(Ext. Nuc. Vom. Liq.)—Liquid Extract of Nux Vomica. It is prepared with alcohol (70 per cent.), defatted, and adjusted with alcohol (45 per cent.) to contain 1·5 per cent. w/v of strychnine (limits, 1·425 to 1·575); 0·2 millilitre contains 0·003 gramme, and 3 minims contains about $\frac{1}{24}$ grain, of strychnine. The final alcohol content is about 40 per cent. Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

Extractum Nucis Vomicæ Siccum, B.P.—(Ext. Nuc. Vom. Sicc.)—Dry Extract of Nux Vomica. It is prepared with alcohol (70 per cent.), the percolate being defatted and evaporated to dryness. It is adjusted with calcium phosphate to contain 5 per cent. of strychnine (limits, 4·75 to 5·25); 0·06 gramme contains 0·003 gramme, and 1 grain contains about $\frac{1}{20}$ grain, of strychnine. It should be stored in small, wide-mouthed, well-closed containers in a cool place. Dose.– 0·015 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

Extractum Strychni I.A. is a defatted extract prepared with alcohol (70 per cent.) and contains 16 per cent. of total alkaloids.

Nux Vomica Pulverata, B.P.—(Nux. Vom. Pulverat.)—Powdered Nux Vomica. *Sym.*—Pulvis Nucis Vomicæ. Nux vomica in fine powder adjusted with powdered nux vomica of different alkaloidal content, or with lactose, to contain 1·2 per cent. of strychnine (limits, 1·14 to 1·26). 0·25 gramme contains 0·003 gramme, and 4 grains contains about $\frac{1}{20}$ grain, of strychnine. Ash, not more than 3 per cent. Dose.– 0·06 to 0·25 gramme (1 to 4 grains).

Pulvis Strychni I.A. contains 2·5 per cent. of total alkaloids.

Pilulæ Aloes et Nucis Vomicæ, B.P.C.—(Pil. Aloes et Nuc. Vom.)—Aloes and Nux Vomica Pills. Each pill contains 2 grains of aloes, $\frac{1}{4}$ grain of dry extract of nux vomica and $\frac{1}{6}$ grain of dry extract of belladonna. Dose.– 1 pill.

Tinctura Nucis Vomicæ, B.P.—(Tinct. Nuc. Vom.)—Tincture of Nux Vomica. Liquid extract of nux vomica, 8·34 per cent. v/v, with alcohol (90 per cent.) and distilled water. It contains 0·125 per cent. w/v of strychnine (limits, 0·119 to 0·131); 2 millilitres contains 0·0025 gramme, and 30 minims contains about $\frac{1}{80}$ grain, of strychnine. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Tinctura Strychni I.A. is prepared with alcohol (70 per cent.) and contains 0·25 per cent. of total alkaloids.

OESTRINUM

(Oestrin.)

Oestrin

Oestrin is a generic term applied to hormones, present in the ovaries and certain other tissues of animals, which have the property of producing those changes in the genital organs of female animals characteristic of the oestrus cycle, and can also produce these changes in the animal after removal of the ovaries. They may be obtained from placenta and from the urine of stallions, pregnant mares and pregnant women.

Oestrins are identified by their power of transforming the vaginal epithelium of ovariectomised rats or mice from the dioestrus to the oestrus form within forty-eight hours of injection under the skin of the animal. They are excreted in small amounts in normal urine, but in much larger quantities during pregnancy. At least two distinct oestrus-producing substances are present in human pregnancy urine, a hydroxyketone, 3-hydroxy-17-keto-1 : 3 : 5-oestratriene, $C_{18}H_{22}O_2$, called ketohydroxyoestrin, oestrone, or the "follicular hormone," and a triol, 3 : 16 : 17-trihydroxy-1 : 3 : 5-oestratriene, $C_{18}H_{24}O_3$, called trihydroxyoestrin, oestriol, or the "follicular hormone hydrate." Ketohydroxyoestrin occurs in the form of colourless crystals which

melt at about 254° to 257°, and the solution is dextrorotatory. It yields a monomethyl derivative which melts at about 165°, and a monoacetate melting at about 125°. Trihydroxyoestrin melts at about 279°, the triacetate at 126°, and the monomethylether at about 165°. On adding concentrated sulphuric acid to trihydroxyoestrin, and warming, an orange colouration with a green fluorescence is produced. Trihydroxyoestrin may be converted into ketohydroxyoestrin by heating with potassium acid sulphate at 180° to 200° and distilling in a vacuum.

The separation of trihydroxyoestrin and ketohydroxyoestrin from crude concentrates obtained from pregnancy urine may be effected by treatment with methyl alcohol (50 per cent.) and light petroleum; the alcoholic layer is separated and extracted with ether, and the residue obtained after evaporating the ethereal layer is treated with methyl alcohol (50 per cent.) and benzene. The benzene solution contains ketohydroxyoestrin, which can be purified by crystallisation. The alcohol contains trihydroxyoestrin, and is extracted with ether after acidification with hydrochloric acid. The ethereal solution is washed with sodium carbonate solution, and the trihydroxyoestrin extracted with sodium hydroxide solution, from which it is precipitated by the addition of hydrochloric acid, extracted with ether and purified by crystallisation.

Ketohydroxyoestrin is easily **soluble** in alcohol, acetone, chloroform, benzene and fixed oils; soluble with difficulty in ether, ethyl acetate and light petroleum; very slightly soluble in water (about 1 in 65,000).

Trihydroxyoestrin is only slightly soluble in ether; more soluble in alcohol, methyl alcohol, chloroform, acetone and fixed oils; completely soluble in potassium hydroxide solution and precipitated from this solution by carbon dioxide; insoluble in aqueous sodium carbonate solution.

Standard.—The potency of preparations of the oestrins is estimated by a biological method, and stated in units. The unit suggested for international use by the Permanent Commission on Biological Standardisation of the League of Nations Health Organisation is defined as the specific oestrus-producing activity in 0·1 gamma (0·0001 milligram) of the standard preparation, this quantity being approximately one-third of the original rat unit of activity. The standard preparation is a sample of the hydroxyketonic form of the hormone normally obtained from urine of pregnancy, and kept at the National Institute for Medical Research, London. The assay of a preparation of oestrin is conducted by comparing its specific oestrus-producing activity with that of the standard, under strictly identical conditions, by a method capable of yielding results with an error not greater than ± 20 per cent. The oestrus-producing activity is the power of producing in adult female rats or mice, completely deprived of their ovaries, the cellular changes in the vaginal secretion characteristic of normal oestrus. At least twenty animals should be used for each dose of the standard and of the preparation under test.

Action and Uses.—When injected into a female animal, ketohydroxy-estrin produces all those changes which facilitate the fertilisation of an ovum. The vaginal canal enlarges, and an epithelial lining is formed, the uterus enlarges and becomes distended with fluid, in which the spermatozoa from the male have the best opportunity of approaching an ovum from the female; ovulation takes place, and ripe ova are discharged from the surface of the ovary to enter the uterus. The action of trihydroxyoestrin is qualitatively the same as that of ketohydroxyoestrin, but quantitatively it is less effective. While ketohydroxyoestrin is relatively ineffective when given by the mouth, trihydroxyoestrin is from one-half to one-third as active by mouth as by hypodermic injection.

The use of oestrin in therapeutics and a satisfactory scale of dosage have not yet been definitely established. Calculations on a weight basis from the doses effective in small animals indicate that in order to obtain appreciable action in the human subject the dose must be extremely large. There is clinical evidence, however, that repeated injections of 150 to 300 units will induce menstruation in patients suffering from amenorrhœa, and are of some value in the treatment of chronic mastitis, and of the vasomotor symptoms of the menopause. There is no evidence that it is of value in human beings for the induction of labour.

The oestrins are **administered** by hypodermic or intramuscular injection. Injected in the form of aqueous solution, the active principle exerts only a transient effect, as it appears to be excreted in the urine very rapidly. Solutions **in** oil exert a more prolonged action, and owing to the greater solubility of oestrin in oil, they make possible the use of larger doses. Trihydroxyoestrin may be administered by the mouth. Solutions of oestrin for **injection** may be sterilised by tyndallisation or by filtration.

SYNTHETIC OESTRUS-PRODUCING COMPOUNDS.—A number of synthetic condensed ring compounds show a well-marked oestrus-producing action when injected into ovariectomised rats. Among the more potent of these are:—9 : 10-dihydroxy-9 : 10-di-*n*-butyl-9 : 10-dihydro-1 : 2 : 5 : 6-dibenzanthracene, 1-keto-1 : 2 : 3 : 4-tetrahydrophenanthrene, 5 : 6-cyclopenteno-1 : 2-benzanthracene, and 1 : 2-benzpyrene. The last two of these are also powerful carcinogenic agents.

OLEUM ABIETIS
(Ol. Abiet.)
Oil of Siberian Fir

Synonyms—Oil of Pine; Oleum Pini.

Oil of Siberian fir is obtained by distillation from the fresh leaves of *Abies sibirica* Ledeb. (Fam. Coniferæ), chiefly in North-East Russia.

It occurs as a colourless or pale yellow liquid, with an agreeable, characteristic, pine-like odour and a pungent taste. Oil of Siberian fir **contains** about 40 per cent. of esters, calculated as bornyl acetate, and also pinene, camphene, dipentene and phellandrene. It should be **stored** in well-closed containers in a cool place and protected from light.

Standard, B.P.—Oil of Siberian fir contains not less than 35 per cent. w/w and not more than 45 per cent. w/w of esters, calculated as bornyl acetate, $C_{12}H_{20}O_2$. Specific gravity, 0·905 to 0·925. Optical rotation, —32° to —45°. Refractive index at 20°, 1·466 to 1·476. It is soluble in an equal volume of alcohol (90 per cent.; specific gravity, 0·8334 to 0·8340).

Action and Uses.—Oil of Siberian fir has properties closely resembling those of oil of pumilio pine; the latter is sometimes preferred on account of its more pleasant odour.

OLEUM AJOWAN

(Ol. Ajowan)

Ajowan Oil

Synonym—Ptychotis Oil.

Ajowan oil is obtained by distillation from the fruits of *Trachyspermum Ammi* (Linn.) Sprague, which is indigenous to and cultivated in India; the fruit yields from 3 to 4 per cent. of the oil. It occurs as an almost colourless or brownish liquid, having the odour of thyme and a sharp, burning taste. Ajowan oil **contains** thymol, which can be crystallised from the oil. Complete separation may be effected by shaking with solution of sodium hydroxide to form the sodium compound, from which thymol is liberated by means of hydrochloric acid, and may be recrystallised finally from alcohol. The remainder of the oil consists of paracymene, $C_{10}H_{14}$, boiling at 175°, and a terpene boiling at 172°, with traces of pinene and dipentene, the mixture being known commercially as "thymene."

Soluble in alcohol (90 per cent.) (1 in 4).

Standard.—Ajowan oil contains not less than 40 per cent. v/v of thymol, $C_{10}H_{14}O$. Specific gravity, 0·910 to 0·930. Optical rotation, 0° to +2°. Refractive index at 20°, 1·485 to 1·510.

Assay.—Proceed by the method of the British Pharmacopœia for the determination of eugenol in Oleum Caryophylli; the unabsorbed oil measures not more than 6 millilitres, corresponding to not less than 40 per cent. v/v of thymol.

Action and Uses.—Ajowan oil is employed in India as an antiseptic and aromatic carminative. Its action and uses are similar to those of thymol.

Dose.– 0·03 to 0·2 millilitre (½ to 3 minims).

OLEUM AMYGDALÆ
(Ol. Amygdal.)
Almond Oil

Almond oil is the fixed oil obtained by pressure from bitter or sweet almond, the greater part being obtained from bitter almond. It occurs as a clear, pale yellow oil, with a slight characteristic odour and a bland, nutty taste. Almond oil **contains** olein, with a small proportion of the glycerides of linolic and other acids; it contains no stearin.

Slightly **soluble** in alcohol (90 per cent.), ether (1 in 2·25); miscible in all proportions with chloroform, benzene and light petroleum.

Standard, B.P.—Almond oil has a specific gravity of 0·915 to 0·920. Refractive index at 40°, 1·4624 to 1·4650. Acid value, not more than 4·0. Saponification value, 188 to 196. Iodine value, 95 to 100. It remains clear after exposure to a temperature of −10° for three hours, and does not congeal until cooled to about −18°. It complies also with tests for the absence of apricot-kernel oil and peach-kernel oil, cottonseed oil, sesame oil, and arachis oil.

Action and Uses.—Almond oil is nutritive, demulcent and laxative. The oil is applied externally as an emollient for chapped hands and slight excoriations. It may be **administered** in the form of an emulsion. Almond oil is usually preferred in the preparation of cold creams and similar toilet articles. It is the basis of some brilliantines, and is added to lotions for the hair. Sterilised almond oil is used for lubricating catheters, and as a vehicle in the preparation of injections. It may be sterilised by heating at 150° for one hour.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Preparation

Lotio Olei Amygdalæ Ammoniata, B.P.C.—(Lot. Ol. Amygdal. Ammon.)—Ammoniated Almond Oil Lotion. *Syn.*—Erasmus Wilson's Hair Lotion; Lotio Crinalis. Almond oil, 1 in 8, with strong solution of ammonia, oil of rosemary, alcohol (90 per cent.) and honey water.

OLEUM AMYGDALÆ AMARÆ
(Ol. Amygdal. Amar.)
Oil of Bitter Almond

Synonym—Oleum Amygdalæ Essentiale.

Oil of bitter almond is obtained by distilling moistened bitter almond cake, and also from the cake of the seeds of the apricot and peach. The oil does not pre-exist in the almond cake, but is formed by the interaction of amygdalin and emulsin, the products of the reaction being benzaldehyde, benzaldehyde-cyanhydrin, hydrocyanic acid and dextrose. Hydrocyanic acid, free and combined, may be present in the natural oil to the extent of 3·5 to 10·0 per cent., but the product is suitably adjusted to contain from 2 to 4 per cent. Oil of bitter almond

occurs as a colourless liquid, having a characteristic odour; it is optically inactive. On exposure to air it is oxidised, and gradually deposits benzoic acid as a solid crystalline mass. This change takes place more readily in the oil freed from hydrocyanic acid, which acts as a preservative. The presence of chlorine indicates contamination with, or substitution by, synthetically prepared benzaldehyde. The absence of chlorides is not an infallible indication of its purity, since benzaldehyde free from chlorine is available.

Sparingly **soluble** in water (1 in 300); soluble in all proportions of alcohol, ether, fixed and volatile oils.

Standard.—Oil of bitter almond, determined by the method for Benzaldehydum, contains not less than 85 per cent. w/w of $C_6H_5 \cdot CHO$, and the equivalent of not less than 2 per cent. and not more than 4 per cent. w/w of HCN. Specific gravity, 1·055 to 1·065. Refractive index at 20°, 1·534 to 1·542. It complies with the limit test for chlorinated compounds in Benzaldehydum. Weigh accurately 5 grammes of the oil and dissolve in neutral alcohol (90 per cent.); the solution requires not more than 1·6 millilitres of N/2 alcoholic potassium hydroxide for neutralisation to phenolphthalein (limit of benzoic acid). Add 0·5 millilitre to 5 millilitres of alcohol, add a small quantity of zinc powder and 2 millilitres of acetic acid, and boil the mixture for about ten seconds; no odour of phenyl isocyanide develops after making the liquid alkaline with sodium hydroxide solution and heating with a few drops of chloroform (absence of nitrobenzene).

Assay.—For hydrocyanic acid. Dissolve about 1 gramme, accurately weighed, in 25 millilitres of alcohol (90 per cent.), add 1 millilitre of potassium iodide solution and 1 millilitre of dilute ammonia solution, and titrate with N/10 silver nitrate to a permanent opalescence; 1 millilitre of N/10 silver nitrate is equivalent to 0·0054 gramme of HCN.

Action and Uses.—Oil of bitter almond is employed as a flavouring agent in confectionery. It is more stable than the oil freed from hydrocyanic acid, and for this reason it is preferred, but it must be used with caution. In cases of **poisoning** by oil of bitter almond, the antidotes are those for Acidum Hydrocyanicum Dilutum.

Dose.– 0·016 to 0·06 millilitre ($\frac{1}{4}$ to 1 minim).

OLEUM AMYGDALÆ AMARÆ SINE ACIDO HYDROCYANICO

(Ol. Amygdal. Amar. s. Acid. Hydrocyan.)

Oil of Bitter Almond without Hydrocyanic Acid

Synonyms—Oleum Amygdalæ Amaræ sine Acido Prussico; Oleum Amygdalæ Amaræ (s.A.P.).

Oil of bitter almond without hydrocyanic acid is oil of bitter almond from which the hydrocyanic acid has been removed by shaking with

milk of lime and ferrous sulphate, whereby hydrocyanic acid is precipitated as calcium ferrocyanide, and redistilling the oil with steam. It is a colourless liquid, with a characteristic odour, and is optically inactive. On exposure to air it is rapidly oxidised, and benzoic acid is deposited as a crystalline mass. This change takes place more rapidly in the oil freed from hydrocyanic acid than in the natural oil. It should be **stored** in small, closely-stoppered bottles and protected from light and air.

Sparingly **soluble** in water (1 in 300); soluble in alcohol, ether, fixed and volatile oils.

Standard.—Oil of bitter almond without hydrocyanic acid, determined by the method for Benzaldehydum, contains not less than 95 per cent. w/w of $C_6H_5 \cdot CHO$. Specific gravity, 1·048 to 1·052. Refractive index at 20°, 1·540 to 1·545. It complies with the limit tests for hydrocyanic acid and chlorinated compounds in Benzaldehydum, and with the limit tests for benzoic acid and nitrobenzene in Oleum Amygdalæ Amaræ.

Action and Uses.—Oil of bitter almond without hydrocyanic acid is employed as a flavouring agent for emulsions, and for use in domestic culinary operations. It should not be confused with Oleum Amygdalæ Amaræ, which contains hydrocyanic acid and which is often preferred by confectioners.

Dose.– 0·016 to 0·06 millilitre ($\frac{1}{4}$ to 1 minim).

Preparation

Spiritus Amygdalæ Amaræ, B.P.C.—(Sp. Amygdal. Amar.)—Spirit of Bitter Almond. *Syn.*—Essence of Bitter Almonds. Oil of bitter almond without hydrocyanic acid, 1 in 16, in alcohol (90 per cent.).

OLEUM ANETHI
(Ol. Aneth.)
Oil of Dill

Oil of dill is obtained by distillation from dill fruit. It occurs as a colourless or pale yellow liquid, becoming darker on keeping, having a characteristic, aromatic odour and a taste which is sweet and aromatic at first, but afterwards pungent. It closely resembles oil of caraway, but contains less carvone. Oil of dill **contains** about 50 per cent. of carvone, $C_{10}H_{14}O$; it also contains limonene, phellandrene and other terpenes, and a paraffin hydrocarbon. It does not contain anethole. East Indian dill oil, from the fruits of *Peucedanum Sowa* Kurz., is distinguished by its higher specific gravity (0·948 to 0·975) lower optical rotation (+41° to +47°), and by its containing dill apiol, which boils at 285° and sinks in water. Genuine oil of dill contains no constituent boiling at so high a temperature, and no portion of the distillate

sinks in water. It should be **stored** in well-closed containers in a cool place and protected from light.

Standard, B.P.—Oil of dill contains not less than 43 per cent. and not more than 63 per cent. w/w of carvone, $C_{10}H_{14}O$. Specific gravity, 0·900 to 0·915. Optical rotation, +70° to +80°. Refractive index at 20°, 1·481 to 1·492. It is soluble in an equal volume of alcohol (90 per cent.; specific gravity, 0·8334 to 0·8340), and in 10 volumes of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640).

Action and Uses.—Oil of dill is employed as an aromatic carminative, especially in the flatulence of infants.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

OLEUM ANISI
(Ol. Anis.)

Oil of Anise

Synonym—Oil of Aniseed.

Oil of anise is obtained by distillation from anise or from star anise, the greater part of the commercial product being obtained from the latter. It occurs as a colourless or pale yellow, highly-refractive liquid, with a characteristic odour and a sweet, aromatic taste. On cooling, it solidifies to a white, crystalline mass, but it can be cooled considerably below its freezing-point without becoming solid if undisturbed, but slight agitation, or the introduction of a crystal of anethole, causes immediate solidification. Exposure to air causes polymerisation, and some oxidation also takes place with formation of anisic aldehyde, $C_8H_8O_2$, and anisic acid. Oil of anise **contains** about 80 to 90 per cent. of anethole, $C_{10}H_{12}O$, to which the characteristic properties of the oil are due. Anethole occurs in the form of white, crystalline laminæ, melting at 21° or as a colourless liquid which boils at 232°. The oil contains also methyl chavicol, an isomeride of anethole and resembling it in odour but not in taste. These two constituents, together with traces of the oxidation products, anisic aldehyde and anisic acid, are the only constituents of proved identity in the oil obtained from anise fruits. In star anise oil, however, *d*-pinene, *l*-phellandrene, the ethyl ether of hydroquinone, and probably safrole, also occur. Oil of anise should be **stored** in well-closed containers, in a cool place and protected from light. If the oil has solidified, it should be melted and mixed before use.

Standard, B.P.—Oil of anise has a specific gravity (20°/15·5°) of 0·980 to 0·994. Optical rotation, −2° to +1°. Refractive index at 20°, 1·553 to 1·560. Freezing-point, not below 15°. Melting-point, not below 17°. It is soluble in three volumes of alcohol (90 per cent.; specific gravity, 0·8334 to 0·8340), the solution showing not more than a slight opalescence. It complies also with a limit test for lead.

Action and Uses.—Oil of anise is employed as an aromatic carminative to relieve flatulence. It is a mild expectorant and is an ingredient of cough lozenges, often in combination with liquorice. The oil may be **administered** on sugar, or as Spiritus Anisi or Elixir Anisi. As an antiseptic and flavouring agent, it is sometimes combined with the oils of sweet birch and peppermint in aromatic mouth-washes and dentifrices. It is also used in the compounding of liqueurs.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

ALDEHYDUM ANISICUM.—Anisic aldehyde, aubepine, or artificial hawthorn, $C_6H_4(OCH_3)\cdot CHO$, may be obtained from oil of anise, or synthetically. It occurs as a colourless or slightly yellowish liquid, having a specific gravity of about 1·127 and a boiling-point of 246°. In combination with sodium pyrosulphite it is known as "crystallised aubepine." Anisic aldehyde is used in perfumery.

Preparations

Elixir Anisi, B.P.C.—(Elix. Anis.)—Elixir of Anise. Oil of anise, about 1 in 300, with oil of fennel, oil of bitter almond without hydrocyanic acid, alcohol (90 per cent.), syrup and distilled water. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Spiritus Anisi, B.P.C.—(Sp. Anis.)—Spirit of Anise. Oil of anise, 1 in 10, in alcohol (90 per cent.). Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

This spirit was included in the British Pharmacopœia, 1914.

OLEUM ANTHEMIDIS

(Ol. Anthem.)

Oil of Chamomile

Oil of chamomile is obtained by distillation from the recently dried flowers of *Anthemis nobilis* Linn. It occurs, when freshly distilled, as a blue liquid, becoming greenish and brownish-yellow under the influence of air and light, and having a strong, but pleasant, aromatic odour and a burning taste. It has a faintly acid reaction. The oil from the German chamomile, *Matricaria Chamomilla* Linn., has a specific gravity of about 0·917 to 0·957, and is much inferior in odour value. Oil of chamomile **contains** esters of angelic and tiglic acids (two isomeric acids of the formula $C_5H_8O_2$) with butyl and amyl alcohols, and butyric acid; it also contains an alcohol, anthemol, $C_{10}H_{16}O$, and a hydrocarbon, anthemene, $C_{18}H_{36}$, which forms crystalline needles melting at 63°. The blue colouration of the freshly-distilled oil is due to the presence of azulene, which can be extracted by strong mineral acids.

Standard.—Oil of chamomile forms a clear solution with 6 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901). Specific gravity, 0·905 to 0·915. Refractive index at 20°, 1·442 to 1·448. Acid value, 1·5 to 14·0. Saponification value, 260 to 296.

Action and Uses.—Oil of chamomile is employed as an aromatic carminative.

Dose.– 0·03 to 0·2 millilitre (½ to 3 minims).

OLEUM ARACHIS

(Ol. Arach.)

Arachis Oil

Synonyms—Nut Oil; Oleum Nucis; Ground-nut Oil; Pea-nut Oil.

Arachis oil is obtained by expression, without heat, from the seeds of *Arachis hypogæa* Linn., a native of Brazil, and cultivated in West Africa, India, China and America. The seeds contain about 40 to 45 per cent. of the fixed oil. It occurs as a pale yellow liquid, with a faint, nutty odour and a bland, nutty taste. It becomes turbid when cooled to about 3° and solidifies at −5°. On exposure to the air, the oil thickens very slowly and becomes rancid. Bleached arachis oil is manufactured in France; it is nearly colourless and almost tasteless. Arachis oil **consists** chiefly of the glyceride of oleic acid, together with glycerides of arachidic, hypogæic, lignoceric and linolic acids, while the "stearine," which separates at low temperatures, contains the glyceride of arachidic acid. The oil contains an approximately constant proportion, about 4·8 per cent., of arachidic and lignoceric acids. The abnormally low solubility in alcohol (70 per cent.) of arachidic acid forms the basis of the usual test for arachis oil.

Slightly **soluble** in alcohol (90 per cent.); miscible with ether, chloroform and light petroleum.

Standard, B.P.—Arachis oil has a specific gravity of 0·916 to 0·920. Refractive index at 40°, 1·4625 to 1·4645. Acid value, not more than 4. Saponification value, 188 to 196. Iodine value, 85 to 99. It complies also with tests for the absence of cottonseed oil, sesame oil, and other vegetable oils.

Action and Uses.—Arachis oil has properties similar to those of olive oil and may be prescribed in place of it. It may be used in India and in the Eastern, African, Australasian and North American divisions of the Empire as a substitute for olive oil in making ointments, liniments, plasters and soaps for which olive oil is directed to be used. In the form of an emulsion it is used for feeding children. Arachis oil may be sterilised by heating at 150° for one hour.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Preparations

Emulsio Olei Arachis, B.P.C.—(Emuls. Ol. Arach.)—Emulsion of Arachis Oil. *Syn.*—Marylebone Cream (Improved). Each fluid drachm contains about ½ fluid drachm of arachis oil and solution of irradiated ergosterol equivalent to about 300 units of antirachitic activity. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Oleum Lubricans, B.P.C.—(Ol. Lubric.)—Lubricant Oil. *Syn.*—Lund's Oil; Catheter Oil. Phenol, 5 per cent. w/v, in castor oil and arachis oil.

OLEUM AURANTII

(Ol. Aurant.)

Oil of Orange

Synonym—Essence of Orange.

Oil of orange is obtained by mechanical means from the fresh peel of the sweet orange, *Citrus sinensis* (Linn.) Osbeck (oil of sweet orange), and also the bitter orange, *Citrus Aurantium* Linn. subsp. *amara* Engl. (oil of bitter orange), chiefly in Calabria and Sicily, but also in the West Indies and Africa. By far the greater part of the oil of commerce is obtained from the sweet orange, but chemically the two oils are practically identical. It is possible, however, to distinguish them by their odour and taste. Oil of orange occurs as a yellow to yellowish-brown liquid, having the characteristic odour of orange, and a mild, aromatic taste, oil of bitter orange being bitter. It deteriorates on keeping, acquiring a disagreeable, terebinthinate taste. The addition of 10 per cent. of dehydrated alcohol to the fresh oil prevents this. It has a neutral reaction. The purity of the oil is best judged by the rotation and odour. Distilled oil of orange is an inferior article, the effect of heat and steam being detrimental to the oxygenated compounds, which are of a very delicate nature. Californian and Spanish oils also occur in commerce; they are usually of a dark colour, and leave a deep orange stain on paper. Oil of orange **contains** at least 90 per cent. of the terpene, *d*-limonene, $C_{10}H_{16}$. Other constituents are decyl aldehyde, the methyl ester of anthranilic acid and a stearoptene of which little is known. Traces of linalol and terpineol have also been found.

Soluble in alcohol (1 in 7), in all proportions of dehydrated alcohol, but not always with formation of bright solutions, on account of the presence of waxy, non-volatile substances.

Standard.—Oil of orange leaves on evaporation not less than 2 per cent. and not more than 4 per cent. w/w of residue. Specific gravity, (oil of sweet orange) 0·848 to 0·852, (oil of bitter orange) 0·852 to 0·856. Optical rotation, (oil of sweet orange) +95° to +99°, (oil of bitter orange) +88° to +96°. Refractive index at 20°, (oil of sweet orange) 1·472 to 1·474, (oil of bitter orange) 1·472 to 1·475. When distilled, the first 10 per cent. of the distillate has an optical rotation the same as, or only slightly lower than, the original oil.

Uses.—Oil of orange is employed in perfumery and in the form of Elixir Aromaticum as a flavouring agent for mixtures.

Dose.– 0·03 to 0·2 millilitre (½ to 3 minims).

Preparation

Elixir Aromaticum, B.P.C.—(Elix. Aromat.)—Aromatic Elixir. *Syn.*—Elixir Aurantii; Elixir Aurantii Compositum. Oil of orange, 1 in 400, with oils of lemon, coriander and anise, alcohol (90 per cent.), syrup and distilled water. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

OLEUM BERGAMOTTÆ

(Ol. Bergam.)

Oil of Bergamot

Synonym—Essence of Bergamot.

Oil of bergamot is obtained by expression from the fresh peel of the fruit of *Citrus Aurantium* Linn. subsp. *bergamia* Engl., cultivated mostly in Southern Calabria. It occurs as a greenish or brownish-yellow liquid, having a pleasant odour and a bitter and very unpleasant taste. Adulteration of oil of bergamot is very easily detected by changes in the physical constants. Oil of turpentine diminishes the specific gravity; fatty oils, cedar wood oil, and gurjun oil increase it; lemon and orange oils increase the rotation and decrease the specific gravity, ester content and solubility. Fatty oils decrease the solubility, and increase the amount of residue on evaporation. Oil of bergamot **contains** the ester, linalyl acetate, $C_{12}H_{20}O_2$, which is the chief source of the fragrance of the oil. In addition to this ester there is usually about 6 per cent. of free *l*-linalol, $C_{10}H_{18}O$, and *d*-limonene, dipentene, pinene, camphene, octylene, and acetic acid. The oil is sometimes rectified, but it suffers in consequence, the ester being partially decomposed. The oil, on keeping, deposits a crystalline magma of bergaptene, $C_{12}H_8O_4$, a non-volatile substance, which is inodorous at ordinary temperatures, but gives off aromatic vapours on heating and melts at about 188°.

Soluble in about one-half its volume of alcohol (90 per cent.), the solution not becoming turbid on the further addition of alcohol. Usually soluble also in twice its volume of alcohol (80 per cent. w/w; 85·5 per cent. v/v).

Standard.—Oil of bergamot, determined by the method of the British Pharmacopœia for the determination of esters in volatile oils, contains not less than 36 per cent. of esters, calculated as linalyl acetate, $C_{12}H_{20}O_2$. Specific gravity, 0·882 to 0·886. Optical rotation, +12° to +24°. Refractive index at 20°, 1·464 to1·467. Residue on evaporation, not less than 4 per cent. and not more than 6 per cent. w/w, the acid value of the residue being between 20 and 50, and the saponification value between 160 and 200. Place in a flask 1 gramme of the oil with 3 millilitres of a 10 per cent. w/v potassium hydroxide solution in dehydrated alcohol; attach an air condenser, heat on a water-bath for 1 minute and allow to cool; no cloudiness or crystalline precipitate is produced within one hour (absence of certain artificial esters). Make two determinations of the ester content, boiling for one hour and two hours respectively; the difference between the two results does not exceed 0·5 per cent. (absence of terpinyl acetate). Shake 10 millilitres of the oil in a separator with 10 millilitres of light petroleum, 2·5 millilitres of alcohol (90 per cent.) and 20 millilitres of water; filter the aqueous layer, neutralise with N/2 alcoholic potassium hydroxide solution and saponify

for one hour with 10 millilitres of N/2 alcoholic potassium hydroxide; not more than 0·2 millilitre is absorbed (absence of glyceryl acetate).

Uses.—Oil of bergamot is largely employed in perfumery, especially in oils and pomades for the hair.

LINALOLUM.—Linalol, or linalool, $C_{10}H_{18}O$, is an open-chain alcohol occurring free in essential oil of linaloe and, in the form of esters, in numerous essential oils. It is a colourless liquid with a sweet odour, having a specific gravity of about 0·870 to 0 880 and a boiling-point of about 198°. It is used in perfumery and for the manufacture of esters of linalol, which are also used in perfumery.

LINALYLIS ACETAS.—Linalyl acetate, $CH_3{\cdot}COOC_{10}H_{17}$, is the principal odorous constituent of oil of bergamot and occurs also in oil of lavender and other oils. It is prepared by the esterification of linalol and occurs as a colourless oil with a powerful bergamot odour and a specific gravity of about 0·900 to 0·910. It is largely used in perfumery.

Preparation

Spiritus Coloniensis, B.P.C.—(Sp.Colon.)—Cologne Spirit. *Syn.*—Aqua Coloniensis. Oils of bergamot, lemon, neroli, rosemary and thyme, and triple orange-flower water, in alcohol (90 per cent.).

OLEUM BETULÆ
(Ol. Betul.)
Oil of Sweet Birch

Synonyms—Oil of Wintergreen; Oleum Gaultheriæ.

Oil of sweet birch was formerly obtained by distillation from the leaves of *Gaultheria procumbens* Linn., but is now distilled from the bark of *Betula lenta* Linn. It occurs as a colourless or yellowish liquid, having a sweetish, aromatic taste and a characteristic odour. The oil does not pre-exist in the bark of *Betula lenta*, but is formed by the interaction of the glycoside, gaultherin, and a ferment, betulase. To 0·5 millilitre of the oil add 0·5 millilitre of a 5 per cent. solution of vanillin in alcohol and 2 millilitres of alcohol, shake well, add 2 millilitres of sulphuric acid and again shake; a blood-red colour is produced. The oil **contains** methyl salicylate, $C_6H_4(OH){\cdot}COOCH_3$, with about 1 per cent. of other bodies including an alcohol or ketone, and an ester, to the presence of which is due the characteristic odour by which oil of sweet birch is distinguished from methyl salicylate.

Standard.—Oil of sweet birch, determined by the method of the British Pharmacopœia for esters in volatile oils, contains not less than 98 per cent. w/w of esters, calculated as methyl salicylate, $C_8H_8O_3$. Specific gravity, 1·182 to 1·192. Optical rotation, +0·5° to −0·5°. Refractive index at 20°, 1·534 to 1·538.

Action and Uses.—Oil of sweet birch is sometimes given internally for acute rheumatism and sciatica. Applied to the skin the oil is readily absorbed; it may, however, give rise to an eruption and methyl salicylate

is therefore preferred for external application. It is an invaluable application for chronic rheumatic affections, fibrositis and lumbago. The oil is usually **administered** in capsules on account of its pungent taste.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

OLEUM CADINUM
(Ol. Cadin.)
Oil of Cade

Synonym—Juniper Tar Oil.

Oil of cade is an empyreumatic, oily liquid obtained by the destructive distillation of the branches and wood of *Juniperus Oxycedrus* Linn., a tree common in the Mediterranean districts of Northern Africa, France and Spain. It occurs as a dark reddish-brown or nearly black, oily liquid, with an empyreumatic odour and an aromatic, bitter and acrid taste. If the oil is shaken with water and filtered, the filtrate is almost colourless and has a slightly acid reaction; it reduces ammoniacal silver nitrate solution and potassio-cupric tartrate solution, and gives a red colour on the addition of a very dilute solution of ferric chloride. Oil of cade is liable to adulteration with coal tar oil or wood tar oil, both of which contain furfurol and catechol. Furfurol may be detected by adding a few drops of aniline to the aqueous filtrate of the oil; if present, an immediate bright red colouration is produced, whereas with pure oil of cade the liquid is colourless, assuming a mahogany-brown tint when shaken with an acid. Catechol may be detected by the deep brown colouration it gives with potassium chromate or dichromate. Wood tar is also detected by the test for pine tar oil. Oil of cade **contains** a high percentage of cadinene, $C_{15}H_{24}$, a sesquiterpene widely distributed among the essential oils and forming a crystallisable dihydrochloride from which it may be regenerated by heating with aniline or sodium acetate and acetic acid. Cadinene has a specific gravity of about 0·918 at 20° and boils at 274° to 275°; on dissolving it in glacial acetic acid and adding a little sulphuric acid, a green colouration is produced which changes through blue to red.

Soluble in ether (1 in 3), and chloroform; partly soluble in cold alcohol (90 per cent.); almost entirely soluble in hot alcohol (90 per cent.); very slightly soluble in water.

Standard, B.P.—Oil of cade has a specific gravity of 0·975 to 1·010. Refractive index at 20°, 1·510 to 1·530. It complies also with a test for absence of pine tar oil.

Action and Uses.—Oil of cade is employed as a stimulant antiseptic in chronic skin diseases and as an ingredient of preparations for the scalp. Unguentum Olei Cadini is applied for psoriasis and eczema, and may be diluted with lard or soft paraffin, if necessary. It is better to

begin with weak preparations, 2 per cent. or less, and to increase the strength gradually, if necessary. Medicated soaps are prepared containing 5 to 10 per cent. of oil of cade.

Preparation

Unguentum Olei Cadini, B.P.C.—(Ung. Ol. Cadin.)—Oil of Cade Ointment. Oil of cade, 25 per cent., in yellow beeswax and yellow soft paraffin.

OLEUM CAJUPUTI

(Ol. Cajuput.)

Oil of Cajuput

Oil of cajuput is obtained by distillation and rectification from the fresh leaves and twigs of *Melaleuca Leucadendron* Linn. and other species of *Melaleuca*, trees indigenous to Northern Australia, the Malay Archipelago, etc., the oil being distilled in the Molucca Islands, rectified by steam distillation, and imported by way of Batavia and Singapore. The green colour of the oil when first distilled is due to contamination with copper; it is removed by the subsequent steam distillation. Oil of cajuput occurs as a colourless or yellow liquid, with an agreeable, camphoraceous odour, and a bitter, aromatic, camphoraceous taste. It **contains** from 50 to 65 per cent. of cineole, $C_{10}H_{18}O$, and also terpineol and its acetic ester, together with *l*-pinene, and valeric, butyric, benzoic and other aldehydes. It should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in alcohol (90 per cent.) in all proportions.

Standard, B.P.—Oil of cajuput contains not less than 50 per cent. and not more than 60 per cent. w/w of cineole, $C_{10}H_{18}O$. Specific gravity, 0·916 to 0·926. Optical rotation, not greater than —4°. Refractive index at 20°, 1·462 to 1·472. Soluble in 2 volumes of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640), becoming less soluble with age.

Action and Uses.—Oil of cajuput has the typical action of a volatile oil and is antispasmodic and carminative. It is an intestinal antiseptic and has been given internally in chronic rheumatism due to intestinal toxæmia. It is excreted by the bronchi and is employed as an antiseptic in the treatment of phthisis. Externally, it acts as a stimulant and mild counter-irritant. It is applied to inflamed and rheumatic joints, diluted with 2 parts of olive oil or turpentine liniment. The oil is **administered** on sugar, in capsules, or as Spiritus Cajuputi, sometimes in combination with spirit of chloroform and aromatic spirit of ammonia.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

Preparation

Spiritus Cajuputi, B.P.—(Sp. Cajuput.)—Spirit of Cajuput. Oil of cajuput, 10 per cent. v/v, in alcohol (90 per cent.). Dose.– 0·3 to 2 millilitres (5 to 30 minims).

OLEUM CAMPHORÆ RECTIFICATUM
(Ol. Camph. Rect.)
Rectified Oil of Camphor

Synonyms—White Oil of Camphor; Light Oil of Camphor; Oleum Camphoræ Essentiale; Essential Oil of Camphor.

Rectified oil of camphor consists of the lighter fractions of the oil obtained as a by-product in the manufacture of camphor from the camphor laurel, *Cinnamomum Camphora* T. Nees and Eberm. It occurs as a colourless or yellowish liquid, having the odour of camphor. Its properties and composition are very variable, largely on account of the more or less complete separation of the camphor and safrole. The chief constituents of the oil are terpenes. The natural oil **contains** safrole, acetaldehyde, camphor, terpineol, eugenol, cineole, *d*-pinene, phellandrene, dipentene and cadinene. The heavy fractions of the oil are valuable as a source of safrole which is used in the preparation of synthetic heliotropin. These have a specific gravity of 1·015 to 1·025 and are known commercially as "brown camphor oil."

Soluble in alcohol (1 in 3).

Standard.—Rectified oil of camphor contains not less than 35 per cent. of cineole. Specific gravity, 0·875 to 0·900. Optical rotation, +9° to +24°. Refractive index at 20°, 1·465 to 1·470.

Assay.—Determine the freezing-point of a mixture of 1·5 grammes of the oil, 1·5 grammes of eucalyptol and 2·1 grammes of *o*-cresol, by the method of the British Pharmacopœia for the determination of cineole; the freezing-point is not below 40° (equivalent to 35 per cent. of cineole).

Action and Uses.—Rectified oil of camphor is employed as a rubefacient and mild counter-irritant to rheumatic and inflamed joints. It may be applied undiluted, or mixed with an equal quantity of olive oil, or with methyl salicylate. It is also used as a parasiticide.

Preparations

Linimentum Methylis Salicylatis, B.P.C.—(Lin. Methyl. Salicyl.)—Liniment of Methyl Salicylate. *Syn.*—Linimentum Betulæ Compositum; Compound Liniment of Birch. Rectified oil of camphor, 1 in 4, with menthol, oil of eucalyptus and methyl salicylate.

Linimentum Methylis Salicylatis Compositum, B.P.C.—(Lin. Methyl. Salicyl. Co.)—Compound Liniment of Methyl Salicylate. Rectified oil of camphor, 1 in 4, with menthol, chloral hydrate, methyl salicylate and chlorophyll.

OLEUM CARDAMOMI
(Ol. Cardamom.)
Oil of Cardamom

Oil of cardamom is obtained by distillation from the whole fruits of *Elettaria Cardamomum* Maton var. *minuscula* Burkill, cultivated in

Ceylon, Mysore, Travancore and Cochin. Oils derived from other species have been examined, but they are inferior in quality, less soluble, and contain a smaller quantity of ester. Oil of cardamom occurs as a colourless or pale yellow oil, with a pungent, aromatic odour and a pleasant, cooling taste. It **contains** cineole, limonene, and terpineol combined as formic and acetic esters.

Standard.—Oil of cardamom has a specific gravity of 0·923 to 0·945. Optical rotation, +20° to +44°. Refractive index at 20°, 1·461 to 1·467. Ester value, 90 to 156. It is soluble in 4 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901).

Action and Uses.—Oil of cardamom has carminative properties, and is sometimes used as a flavouring agent.

Dose.– 0·03 to 0·2 millilitre (½ to 3 minims).

OLEUM CARI

(Ol. Cari)

Oil of Caraway

Synonym—Oleum Carui.

Oil of caraway is obtained by distillation from freshly crushed caraway, and subsequent rectification. It occurs as a colourless or pale yellow liquid, with a characteristic odour and a mild, spicy taste. Exposure to the air causes the oil to become viscous and to increase in specific gravity. This also applies to carvone, the chief constituent of the oil. Oil of caraway **contains** about 58 per cent. of carvone. The only other important constituent is the terpene, *d*-limonene, also called carvene, the specific gravity of which is 0·846, the optical rotation, about +107°, and the boiling-point, 175° to 176°. Carvacrol is said to be present in traces. Oil of caraway should be **stored** in well-closed containers in a cool place and protected from light.

Standard, B.P.—Oil of caraway contains not less than 53 per cent. and not more than 63 per cent. w/w of carvone, $C_{10}H_{14}O$. Specific gravity, 0·910 to 0·920. Optical rotation, +70° to +80°. Refractive index at 20°, 1·485 to 1·492. It is soluble in an equal volume of alcohol (90 per cent.; specific gravity, 0·8334 to 0·8340), and in 7 volumes of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640).

Action and Uses.—Oil of caraway is an aromatic carminative and is used in purgative pills to allay the tendency to gripe. It may be administered on sugar to relieve flatulent colic, and as Aqua Cari to children for the same purpose.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

CARVONUM.—Carvone, $C_{10}H_{14}O$, is a ketone contained in caraway, dill and spearmint oils. That occurring in caraway and dill oils is dextrorotatory, while that from spearmint oil is lævorotatory. It occurs as a thickish, colourless or slightly yellow liquid with an odour of caraway. Specific gravity, about 0 965. Boiling-point, about 224°. It is miscible with all proportions of alcohol, soluble in alcohol (70 per cent.) (1 in 2), and in alcohol (50 per cent.) (1 in 20); carvone containing 2 per cent. of limonene will not form a clear solution under these conditions. Carvone has the aromatic and carminative properties of oil of caraway.

OLEUM CARYOPHYLLI

(Ol. Caryoph.)

Oil of Clove

Oil of clove is obtained by distillation from clove and is largely imported from Zanzibar and Pemba. It occurs, when freshly distilled, as a colourless or pale yellow liquid, which darkens with age or on exposure to the air, becoming reddish-brown. It has a strongly aromatic odour and a persistent burning taste. Oil of clove **contains** about 88 per cent. of eugenol, $C_{10}H_{12}O_2$, which is the most valuable and characteristic constituent of the oil. It may be extracted by treating the oil with dilute sodium hydroxide solution, washing the solution with ether and decomposing it with sulphuric acid. Oils containing 95 per cent. or more of eugenol are less fragrant and are used chiefly for the manufacture of vanillin. Oil of clove also contains the sesquiterpene, caryophyllene, $C_{15}H_{24}$, furfural, $C_5H_4O_2$, which is probably the cause of the oil darkening on storage, methylamylketone, $C_5H_{11}COCH_3$, a body which communicates the much valued fruity odour to the oil, vanillin, methyl salicylate and about 10 per cent. of acetyleugenol. It should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in alcohol (90 per cent.) in all proportions; soluble in ether and glacial acetic acid.

Standard, B.P.—Oil of clove contains not less than 85 per cent. and not more than 90 per cent. v/v of eugenol, $C_{10}H_{12}O_2$. Specific gravity, 1·047 to 1·060. Refractive index at 20°, 1·528 to 1·537. It is soluble in 2 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901).

Action and Uses.—Oil of clove, like other volatile oils, is antiseptic and antiputrescent, and is often employed as a preservative. Internally, oil of clove is antispasmodic and carminative; doses of 3 to 5 minims have been given in phthisis, to reduce expectoration in coughs. Applied externally, it is rubefacient, counter-irritant and slightly anæsthetic; mixed with two parts of olive oil it may be applied to neuralgic areas; as Linimentum Succini Compositum, it is employed as an embrocation for bronchitis, whooping cough and rheumatism. Oil of clove may be **administered** on sugar or in capsules to allay flatulent colic, and is added to purgative pills to prevent gripe. Pills containing a large

proportion of oil may be massed by the addition of a little soap. Oil of clove is applied on cotton wool to allay pain in dental caries, and as a dressing and an ingredient of temporary fillings in dental practice. It is used in microscopy as a clearing agent.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

OLEUM CASSIÆ
(Ol. Cass.)
Oil of Cassia

Oil of cassia is obtained by distillation from the leaves and twigs of *Cinnamomum Cassia* Blume, cultivated in Southern China, and rectified by redistillation. It occurs as a mobile, yellowish, strongly refractive liquid, having an odour and taste resembling those of oil of cinnamon, but the odour is less fragrant and more pungent, and the taste, which is sweetish, spicy and burning, is harsher than that of oil of cinnamon. It is optically inactive, or only slightly dextrorotatory or slightly lævorotatory. The alcoholic solution is slightly acid to litmus. Boiling-point, 240° to 260°, with partial decomposition. On exposure to air, the oil becomes darker in colour and more viscous. On cooling the oil to 0° and then shaking it with an equal volume of nitric acid, a crystalline mass is formed. Oil of cassia **contains** cinnamic aldehyde; it also contains cinnamic acid, cinnamyl acetate, and a terpene. It should be **stored** in well-stoppered, amber-coloured bottles.

Standard.—Oil of cassia, determined by the method of the British Pharmacopœia for the determination of cinnamic aldehyde in Oleum Cinnamomi, contains not less than 80 per cent. w/w of aldehydes, calculated as C_9H_8O. Specific gravity, 1·055 to 1·065. Refractive index at 20°, 1·600 to 1·606. It complies with the limit test for lead in Oleum Anisi. It is soluble in 2 volumes of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640); it yields a clear solution with 3 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901) and no turbidity is produced in the solution on the addition of lead acetate solution (absence of resins). 0·2 millilitre dissolved in 10 millilitres of alcohol produces on the addition of a drop of ferric chloride solution a brown, but not a green or blue, colouration (limit of oil of clove and phenols).

Action and Uses.—Oil of cassia has properties resembling those of oil of cinnamon. As a flavouring agent it is inferior to oil of cinnamon.

Dose.– 0·03 to 0·2 millilitre ($\frac{1}{2}$ to 3 minims).

OLEUM CEDRI
(Ol. Cedri)
Cedar Wood Oil

Synonym—Oil of Red Cedar.

Cedar wood oil is obtained by distillation from the wood of various species of red cedar, the chief of which is *Juniperus virginiana* Linn., a North American tree, in which the oil exists to the extent of 2·5 to 4·5 per cent. It occurs as an almost colourless or slightly yellow, somewhat viscous liquid, occasionally containing crystals of cedar camphor, and having a mild but persistent, characteristic odour. An inferior oil is obtained in America as a by-product in the process of drying wood for the manufacture of lead pencils; it contains only the more volatile portions of the natural oil and has a lower specific gravity. Cedar wood oil **consists** almost entirely of cedrene, a liquid sesquiterpene, $C_{15}H_{24}$, which can be separated by fractional distillation; boiling-point 261° to 262°; specific gravity, about 0·9351. It may also contain a solid substance, cedar camphor or cedrol, $C_{15}H_{26}O$, a sesquiterpene alcohol melting at 86° to 87° after purification. The oil used for microscopical purposes, having a refractive index of 1·515 to 1·526, is specially prepared and is a mixture of cedar wood oil with other substances.

Soluble in alcohol (1 in 20 to 1 in 10).

Standard.—Cedar wood oil has a specific gravity of 0·941 to 0·950. Optical rotation, −25° to −46°; Refractive index at 20°, 1·495 to 1·510.

Action and Uses.—Cedar wood oil has been recommended for use in place of oil of sandal wood in the treatment of gonorrhœa, but is rarely so employed. It is used for its odour in perfumery and as a clearing agent in microscopy.

OLEUM CHAULMOOGRÆ
(Ol. Chaulmoog.)
Chaulmoogra Oil

Chaulmoogra oil is obtained by expression from the seeds of *Hydnocarpus Kurzii* (King) Warb. It occurs as a solid fat, or, at tropical temperatures, as a brownish-yellow oil, with a characteristic odour, a somewhat acrid taste and an acid reaction. A mixture of 1 millilitre of the oil with 0·05 millilitre of sulphuric acid acquires a reddish-brown colour, changing to olive-green. The oil **consists** mainly of glycerides of chaulmoogric acid, $C_{18}H_{32}O_2$, and hydnocarpic acid, $C_{16}H_{28}O_2$, with smaller quantities of glycerides of palmitic acid, and fatty acids the exact nature of which has not been ascertained.

Soluble in ether, chloroform and carbon disulphide.

Standard.—Chaulmoogra oil has a melting-point of about 25°. Specific gravity, about 0·95 at 25°. Specific rotation at 20°, determined on a 10 per cent. w/v solution in chloroform, +48° to +52°. Acid value, 22 to 30. Saponification value, 196 to 213. Iodine value, 98 to 104. Melting-point of the mixed fatty acids, 44° to 45°.

Action and Uses.—Chaulmoogra oil probably owes its beneficial properties to the presence of the characteristic, cyclic, unsaturated chaulmoogric and hydnocarpic acids. It is used almost exclusively in the treatment of leprosy, and its employment has given good results. It acts possibly by stimulating the leucocytes and by penetrating the wall of the leprosy bacillus, thus rendering it more vulnerable, It may be used externally by inunction, alone or diluted with oil it may be injected, and orally it may be **administered** in capsules or as an emulsion. Injections of the oil may at first be given weekly, the dose being gradually increased and the interval between the injections diminished. Chaulmoogra oil for **injection** may be sterilised by heating at 150° for one hour.

Dose.– 0·3 to 1 millilitre (5 to 15 minims), increased gradually to 4 millilitres (60 minims), by the mouth; 2 millilitres (30 minims), increased gradually to 5 millilitres (75 minims), by subcutaneous and intramuscular injection.

Preparation

Unguentum Chaulmoograe, B.P.C.—(Ung. Chaulmoog.)—Chaulmoogra Ointment. Chaulmoogra oil, 10 per cent., in hard and soft paraffins.

This ointment was included in the British Pharmacopœia, 1914.

OLEUM CHENOPODII

(Ol. Chenopod.)

Oil of Chenopodium

Synonym—Oil of American Wormseed.

Oil of chenopodium is obtained by steam distillation from the fresh flowering and fruiting plants, excluding roots, of chenopodium. It occurs as a colourless or pale yellow liquid, with a disagreeable, penetrating, camphoraceous odour and a bitter, burning taste. The oil is decomposed on heating; when a small quantity of the oil is heated to incipient ebullition with a fragment of unglazed porcelain and then removed from the source of heat, it continues to boil for a few seconds leaving, on cooling, a deep golden-yellow liquid. This test should be carried out cautiously as the decomposition may take place with explosive violence. Oil of chenopodium **contains** about 70 per cent. of ascaridole. It also contains *p*-cymene, α-terpinene, *l*-limonene, and *l*-Δ-2 : 8-*p*-menthadiene. It should be **stored** in a cool place and protected from light.

Standard, B.P.—Oil of chenopodium contains not less than 65 per cent. w/w of ascaridole, $C_{10}H_{16}O_2$. Specific gravity, 0·960 to 0·980. Optical rotation, −4° to −8°. Refractive index at 20°, 1·474 to 1·479. It is soluble in from 3 to 10 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901).

Action and Uses.—Oil of chenopodium is employed as an anthelmintic for hook-worms and round-worms. The treatment for round-worms frequently consists in allowing the patient a light supper at night, administering 0·6 millilitre (10 minims) of the oil in a gelatin capsule on a fasting stomach the next morning, with another dose of the oil two hours afterwards, followed in two hours by a purge of magnesium sulphate. Food should not be taken until the purge has acted. The treatment should be repeated ten days later. Toxic symptoms are transient dizziness and vomiting. For hook-worms, the dose must be larger, and 15 minims of oil in capsules or on sugar, repeated after an interval of two hours and followed by castor oil or magnesium sulphate, may be given. A mixture of 1 volume of oil of chenopodium with 2 volumes of carbon tetrachloride is more effective, and may be given in doses of 0·1 millilitre (1½ minims) for each year of age up to a maximum of 1·5 millilitres (25 minims); this should be divided into 2 doses, given one hour apart and the second dose followed by magnesium sulphate. The treatment requires weekly repetition until the fæces are free from ova. Treatment for hook-worms with oil of chenopodium should not be given to patients suffering from acute diseases, cardiac or renal disease, pulmonary tuberculosis or anasarca. In cases of **poisoning,** a purgative should be administered followed by an enema; alcohol should be withheld and warmth applied to the body.

Dose.– 0·2 to 1 millilitre (3 to 15 minims).

OLEUM CINNAMOMI
(Ol. Cinnam.)
Oil of Cinnamon

Oil of cinnamon is obtained by distillation from cinnamon bark. It occurs, when freshly distilled, as a light yellow liquid which darkens with age, becoming reddish-brown; it has a characteristic fragrant odour and a warm, sweet, spicy taste. It has a much more delicate odour and flavour than oil of cassia, which it resembles in composition. Adulteration with cinnamon leaf oil diminishes the cinnamic aldehyde content and increases that of the eugenol; it may be detected by the blue colour produced by adding ferric chloride to a dilute alcoholic solution. Adulteration with cassia oil increases the specific gravity and also the cinnamic aldehyde content. Oil of cinnamon **contains** chiefly cinnamic aldehyde, about 58 per cent.; the oil also contains

about 4 to 8 per cent. of eugenol, together with phellandrene and other terpenes. The value of cinnamon oil is not altogether dependent on the amount of cinnamic aldehyde it contains, as is the case with oil of cassia, but rather on the non-aldehydic bodies to which the fine flavour is probably due. It should be **stored** in well-closed containers in a cool place and protected from light.

Standard, B.P.—Oil of cinnamon contains not less than 50 per cent. and not more than 65 per cent. w/w of cinnamic aldehyde, C_9H_8O. Specific gravity, 1·000 to 1·030. Optical rotation, 0° to −2°. Refractive index at 20°, 1·565 to 1·582. It is soluble in 3 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901), the solution being not more than slightly opalescent. It complies also with a test for absence of cinnamon leaf oil and cassia oil.

Action and Uses.—Oil of cinnamon, like the other essential oils, is carminative and possesses antiseptic properties. It is **administered** in capsules, on sugar, or as Spiritus Cinnamomi for common colds and influenza. The oil is inhaled for phthisis (30 minims in 1 pint of hot water) and is used as a spray (1 in 20 of light liquid paraffin) in catarrh. Lozenges and pastilles are also prepared containing the oil. It is used largely as a flavouring agent and sometimes as a preservative.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

ALCOHOL CINNAMICUM.— Cinnamic alcohol, $C_6H_5{\cdot}CH:CH{\cdot}CH_2OH$, or styrone, occurs as the cinnamic or acetic ester in storax, balsam of Peru and in oils of hyacinth and other flowers. It is obtained synthetically or by hydrolysis of the naturally occurring esters, and occurs when pure as a crystalline solid, melting at 30° to 33°. Owing to the presence of traces of impurities, it usually occurs as a colourless liquid having a specific gravity of about 1·020 and a boiling-point of 258°. It has a weak but delicate hyacinth-like odour and is used in perfumery.

ALDEHYDUM CINNAMICUM.—Cinnamic aldehyde, $C_6H_5{\cdot}CH:CH{\cdot}CHO$, occurs naturally in oils of cinnamon and cassia, and may be extracted therefrom or prepared synthetically. It occurs as a liquid having a specific gravity of 1·054 to 1·057 and a boiling-point of 253°. It is employed as an ingredient of soap perfumes.

ALDEHYDUM HYDROCINNAMICUM. — Hydrocinnamic aldehyde, $C_6H_5{\cdot}CH_2{\cdot}CH_2{\cdot}CHO$, is prepared from cinnamic aldehyde and occurs as a colourless liquid having a specific gravity of 1·018. It has a powerful odour, is unaffected by alkalis, and is therefore used in soap perfumery.

Preparations

Capsulæ Quininæ Ammoniatæ et Cinnamomi, B.P.C.—(Caps. Quinin. Ammon. et Cinnam.)—Capsules of Ammoniated Quinine and Cinnamon. Each capsule contains quinine sulphate, ammonium bicarbonate and oil of cinnamon, and is approximately equivalent to 1 fluid drachm of solution of ammoniated quinine with ½ minim of oil of cinnamon. Dose.– 1 capsule.

Capsulæ Quininæ et Cinnamomi, B.P.C.—(Caps. Quinin. et Cinnam.)—Capsules of Quinine and Cinnamon. Each capsule contains 1 grain of quinine sulphate and 1 minim of oil of cinnamon. Dose.– 1 capsule.

Spiritus Cinnamomi, B.P.C.—(Sp. Cinnam.)—Spirit of Cinnamon. Oil of cinnamon, 1 in 10, in alcohol (90 per cent.). Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

This spirit was included in the British Pharmacopœia, 1914.

OLEUM CITRONELLÆ
(Ol. Citronell.)
Oil of Citronella

Oil of citronella is obtained by distillation from *Cymbopogon Nardus* Rendle, which is grown principally in Ceylon, Burma and the Straits Settlements. It occurs as a nearly colourless or pale yellow oil, with a pleasant odour. The addition of Russian petroleum or resin spirit reduces the solubility and decreases the percentage of acetylisable constituents. There are two types of oil of citronella in commerce, Ceylon and Java, the latter comprising the oils from Burma and the Straits Settlements. They differ in odour and **composition**, the chief constituents being geraniol and citronellal, the Java oil containing 30 to 40 per cent. of the latter. Ceylon oil usually contains not more than 10 per cent. of citronellal. Camphene, dipentene, limonene, traces of linalol, borneol, methylheptenone, methyleugenol and sesquiterpenes are also present.

Soluble in alcohol (90 per cent.).

Standard.—Oil of citronella (Ceylon) contains not less than 57 per cent., and oil of citronella (Java) contains not less than 85 per cent. w/w of total acetylisable constituents, calculated as geraniol. Specific gravity, (Ceylon oil) 0·897 to 0·912, (Java oil) 0·885 to 0·900. Optical rotation, (Ceylon oil) −6° to −14°, (Java oil) −2° to −5°. Refractive index at 20°, (Ceylon oil) 1·479 to 1·485, (Java oil) 1·468 to 1·473. One part of oil of citronella, when well shaken with 10 parts of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640), yields a clear or slightly opalescent solution, no globules on the surface being visible to the naked eye after the solution has stood for twenty-four hours at a temperature not lower than 15·55° (60°F.).

Assay.—Proceed by the method of the British Pharmacopœia for the determination of free alcohols in volatile oils, calculating the percentage of total acetylisable constituents as geraniol, using the formula:—

$$\text{Percentage of total acetylisable constituents} = \frac{7{\cdot}707n}{\text{Weight of acetylated oil} - 0{\cdot}021n}$$

where n = the number of millilitres of N/2 alcoholic potassium hydroxide absorbed during the saponification of the acetylated oil.

Uses.—Oil of citronella is used as a perfume for soaps and brilliantines. It is also used as a constituent of mosquito repellants.

CITRONELLALUM.—Citronellal, as found in commerce, consists of a mixture of two isomeric aldehydes of the formula $C_{10}H_{18}O$. It is extracted from oil of citronella by means of its bisulphite compound, and occurs as a pale yellow or colourless oil, having a specific gravity of about 0·855 to 0·860 and a boiling-point of 205° to 208°. It is used in perfumery and in the manufacture of hydroxycitronellal.

CITRONELLOLUM.—Citronellol, as found in commerce, consists of a mixture of two isomeric alcohols of the formula $C_{10}H_{20}O$. It may be obtained by the reduction

of citronellal and occurs as a colourless liquid with a faint rose odour, and has a specific gravity of about 0·860 and a boiling-point of about 225°. It is used in perfumery.

HYDROXYCITRONELLALUM.—Hydroxycitronellal, or lily aldehyde, is prepared from citronellal and consists of a mixture of at least two substances, namely hydroxycitronellal and dihydroxycitronellal. It occurs as a colourless or pale yellow oil with a powerful, sweet odour, having a specific gravity of about 0·955 and a boiling-point of about 115° to 135° under 10 mm. pressure. It is used in perfumery.

OLEUM COCOIS
(Ol. Cocois)

Coconut Oil

Coconut oil is a fat obtained by expression from the kernels of the coconut, the fruit of *Cocos nucifera* Linn. and *C. butyraceæ* Linn. It occurs as a solid, white or pearl-white fat, of the consistence of lard, having a bland taste and an odour of coconut. On exposure to the air, the oil readily turns rancid, acquiring an unpleasant odour and a strong acrid taste. It is readily saponified by the strong alkalis and, since the soap formed is not easily precipitated by salt solution, it is largely used in making "marine" soap. The solid fats are often separated from the liquid by cold pressure and deodorised for various technical uses. The "stearin" so obtained is sometimes used as an adulterant of oil of theobroma. Coconut oil melts between 20° and 26°. The chief glycerides of the oil are trimyristin and trilaurin; it contains smaller proportions of tripalmitin, tristearin and triolein, and the glycerides of the volatile caproic, caprylic and capric acids.

Soluble in alcohol (1 in 2) at 60°, less soluble at ordinary temperatures; very soluble in ether, chloroform and carbon disulphide.

Standard.—Coconut oil has a solidifying-point of 22° to 23·5°. Refractive index at 40°, 1·4485 to 1·4495. Acid value, not more than 6. Saponification value, 255 to 258. Iodine value, 7·9 to 9·5.

Action and Uses.—Coconut oil has been recommended as an ointment basis on account of its ready absorption; Unguentum Olei Cocois is suitable for this purpose. Coconut oil is used as a lubricant in massage, as a dressing for the hair, and in the manufacture of soap and margarine. Liquor Saponis Olei Cocois is used as a shampoo in dermatological practice.

PALM-KERNEL OIL, sometimes called palm-nut oil, a fat much resembling coconut oil, is obtained by pressing the kernels of the fruit of the palm tree, *Elæis guineensis* Jacq., growing on the West Coast of Africa. It occurs as a white fat which, when free from rancidity, possesses a pleasant odour and nutty taste. In composition and general characters it closely resembles coconut oil, and when deodorised can be distinguished from the latter only with some difficulty, especially in mixtures; melting-point, 21° to 24°; solidifying-point, 26° to 26·5°; saponification number, 246 to 249; iodine value, 14 to 19. It should be carefully distinguished from palm oil (see Oleum Palmæ). Palm-kernel oil is used for the same purposes as coconut oil.

Preparations

Liquor Saponis Olei Cocois, B.P.C.—(Liq. Sap. Ol. Cocois)—Solution of Coconut Oil Soap. An aqueous solution of the sodium and potassium soaps of the fatty acids of coconut oil, saturated with thymol.

Unguentum Olei Cocois, B.P.C.—(Ung. Ol. Cocois)—Coconut Oil Ointment. Coconut oil, 7 parts, and white soft paraffin, 3 parts.

OLEUM COPAIBÆ
(Ol. Copaib.)
Oil of Copaiba

Oil of copaiba is obtained by distillation from the oleo-resin of various species of *Copaifera* Linn., indigenous to Brazil, Venezuela, New Granada, and other parts of Central and South America. It occurs as a colourless or pale yellow liquid, having the characteristic pepper-like odour of the balsam, a bitter, pungent, persistent taste, and a neutral reaction. The chief adulterants are gurjun oil and oil of African copaiba. Pará copaiba yields 60 to 90 per cent. of oil and Maracaibo and Maranham copaiba about 45 per cent. The chief and only well-defined constituent of oil of copaiba is the sesquiterpene, caryophyllene, $C_{15}H_{24}$, identical with that from oil of clove.

Soluble in alcohol (1 in 20).

Standard.—Oil of copaiba has a specific gravity of 0·895 to 0·908. Optical rotation, —7° to —35°. Refractive index at 20°, 1·495 to 1·500. A solution of 1 millilitre of the oil in 5 millilitres of glacial acetic acid does not develop more than a faint reddish or purple colouration on the addition of 4 drops of nitric acid (absence of gurjun oil). When distilled under reduced pressure, the first 10 per cent. of the distillate has an optical rotation lower than that of the original oil (absence of oil of African copaiba).

Action and Uses.—Oil of copaiba resembles copaiba in its action. It may be administered in capsules or as an emulsion.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

OLEUM CORIANDRI
(Ol. Coriand.)
Oil of Coriander

Oil of coriander is obtained by distillation from coriander. It occurs as a colourless or pale yellow liquid with a characteristic, aromatic odour and a warm, spicy taste. Oil of coriander **contains** coriandrol, $C_{10}H_{17}OH$, the dextro-isomeride of linalol, which has a specific gravity of 0·868,

boils at 194° to 198°, and may occur to the extent of 45 to 65 per cent.; on oxidation it yields citral and may be converted into geraniol. Other constituents of the oil are *d*-pinene, β-pinene, terpinene, decyl aldehyde, geraniol and borneol. The characteristic odour of the oil is due to a body not yet identified. Oil of coriander should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in alcohol (90 per cent.) (2 in 1).

Standard, B.P.—Oil of coriander has a specific gravity of 0·870 to 0·884. Optical rotation, +8° to +15°. Refractive index at 20°, 1·462 to 1·472. It is soluble in 3 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901).

Action and Uses.—Oil of coriander is aromatic, stimulant and carminative. It is added to purgative medicines to diminish the tendency to griping.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

OLEUM CROTONIS
(Ol. Croton.)
Croton Oil

Croton oil is obtained from the seeds of *Croton Tiglium* Linn., indigenous to the Malabar Coast and cultivated in Southern Asia and China. The oil is expressed in India or England. It occurs as an amber-yellow, orange, or brown, viscid liquid, having a nauseous odour and a taste at first mild, but afterwards sharp and acrid. It is a weak drying oil and thickens somewhat on exposure to the air. It is slightly dextrorotatory. It has been stated to **contain** the glycerides of stearic, palmitic, myristic, lauric, valeric, butyric, acetic, formic, oleic, linolic and tiglic acids. The active constituent is a powerfully vesicant substance, named croton-resin, which is believed to be a lactone of complicated structure. It is a hard, pale yellow, brittle substance, nearly insoluble in water, light petroleum and benzene, but readily soluble in alcohol, ether and chloroform. It has neither basic nor acidic properties, but produces, on oxidation with nitric acid, a mixture of acids. The vesicating power of the resin is destroyed by boiling with alkalis, or by hydrogenation.

Soluble in less than one volume of dehydrated alcohol forming a clear solution; with an equal volume the solution is turbid, and more alcohol causes complete separation into two layers, the vesicating constituent being contained in the alcoholic solution. The solubility in alcohol appears to depend upon the proportion of free acids present, and increases with the age of the oil. Freely soluble in light petroleum, ether, chloroform, carbon disulphide, and fixed and volatile oils Completely soluble in glacial acetic acid at ordinary temperatures

Standard.—Croton oil has a specific gravity of 0·940 to 0·955. Refractive index at 40°, 1·470 to 1·473. Saponification value, 205 to 220. Iodine value, 102 to 118. It thickens slightly, but does not solidify either completely or partially, when vigorously shaken with half its volume of fuming nitric acid and the same proportion of water (limit of other non-drying oils). It is soluble in all proportions of light petroleum (limit of castor oil).

Action and Uses.—Croton oil is an extremely powerful cathartic; except in very small doses it is a powerful irritant of the stomach and intestines, causing violent vomiting and purging, followed by collapse. It must, therefore, be used with great care, and is contra-indicated in feeble subjects, where there is organic obstruction, or in inflammatory conditions of the stomach and intestine. It is sometimes administered as a purgative in cases of mental derangement showing violence. Its use may be followed by the appearance of a pustular eruption. The oil is **administered** on sugar, or mixed with butter. Externally, croton oil is a powerful counter-irritant and vesicant; it is used in the form of Linimentum Crotonis.

Dose.– 0·03 to 0·06 millilitre ($\frac{1}{2}$ to 1 minim).

Preparation

Linimentum Crotonis, B.P.C.—(Lin. Croton.)—Liniment of Croton Oil. Croton oil, about 1 in 8, with oil of cajuput and alcohol (90 per cent.).

This liniment was included in the British Pharmacopœia, 1914.

OLEUM CUBEBÆ
(Ol. Cubeb.)

Oil of Cubeb

Oil of cubeb is obtained by steam distillation from the coarsely ground fruit of *Piper Cubeba* Linn. It occurs as a colourless, pale yellow or bluish-green liquid, having the characteristic odour and warm, camphoraceous taste of cubeb. The green colour of the oil is not due to the presence of copper, as is frequently supposed, but to a blue fraction containing azulene. The oil **consists** mainly, if not wholly, of terpenes and sesquiterpenes. Dipentene, $C_{10}H_{16}$, a lævorotatory terpene (optical rotation, —35·5°), presumably pinene or camphene, and two sesquiterpenes, one identical with cadinene, $C_{15}H_{24}$, are present. Cubeb camphor which occurs in oil distilled from old cubeb, appears to be a crystalline sesquiterpene alcohol, derived from the sesquiterpenes by hydration and having the formula, $C_{15}H_{25}OH$. It is lævorotatory, crystallising in rhombic form and melting at 65° to 70°. It is somewhat unstable, decomposing, when kept over sulphuric acid, into sesquiterpene and water.

Soluble in alcohol (90 per cent.) (1 in about 18) and in all proportions of dehydrated alcohol.

Standard.—Not less than 60 per cent. of oil of cubeb distils between 250° and 280°. Specific gravity, 0·910 to 0·930. Optical rotation, −20° to −35°. Refractive index at 20°, 1·480 to 1·502.

Action and Uses.—Oil of cubeb has properties resembling those of copaiba. It is employed internally, as a stimulating antiseptic to the bronchial and genito-urinary mucous membranes, in chronic bronchitis, gonorrhœa and cystitis. It is excreted by the bronchioles, kidneys and skin. The oil may be **administered** as an emulsion or in capsules. It is inhaled from hot water in the treatment of chronic bronchitis. Oleo-resin of cubeb has the stimulant and diuretic properties of the oil and is sometimes preferred; it is usually dispensed in capsules.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

OLEUM CUMINI
(Ol. Cumin.)

Oil of Cummin

Oil of cummin is obtained by distillation from the fruits of *Cuminum Cyminum* Linn., a native of Egypt and the Mediterranean countries, and cultivated in Arabia, India and China. The oil is colourless or pale yellow when freshly distilled, but becomes darker on keeping. It has an unpleasant, characteristic odour, and a spicy, somewhat bitter taste. Oil of cummin **contains** cuminic or cumic aldehyde, *p-iso*propylbenzaldehyde (30 to 35 per cent.). The hydrocarbons consist of *p*-cymene, *β*-pinene and dipentene. *β*-phellandrene and a hydrogenated cuminic alcohol are probably present.

Standard.—Oil of cummin contains not less than 30 per cent. w/w of cuminic aldehyde, $C_{10}H_{12}O$. Specific gravity, 0·900 to 0·935. Optical rotation, +3° to +8°. Refractive index at 20°, 1·495 to 1·509. It is soluble in 10 volumes of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640).

Assay.—Weigh accurately into a stoppered tube about 1·5 grammes of oil; add 12 millilitres of N/2 hydroxylamine hydrochloride reagent prepared with 60 per cent. alcohol, and 1 drop of methyl orange indicator; shake well, and titrate with N/2 alcoholic potassium hydroxide; each millilitre of N/2 alcoholic potassium hydroxide is equivalent to 0·0743 gramme of $C_{10}H_{12}O$, which allows for the correcting factor for methyl orange.

Action and Uses.—Oil of cummin has a carminative action; it is used chiefly in veterinary medicine.

OLEUM EUCALYPTI

(Ol. Eucalyp.)

Oil of Eucalyptus

Oil of eucalyptus is obtained by rectifying the oil distilled from the fresh leaves of *Eucalyptus polybractea* R. T. Baker, *E. dumosa* A. Cunn., and other species of *Eucalyptus* which yield oils containing a large proportion of cineole and but little phellandrene. It occurs as a colourless or pale yellow liquid, with an aromatic, camphoraceous odour and a pungent, camphoraceous taste followed by a sensation of coldness. Oil of eucalyptus **contains** chiefly cineole, $C_{10}H_{18}O$, also known as eucalyptol or cajuputol. Other constituents are *d*-pinene and other terpenes, and various alcohols, aldehydes and esters; phellandrene may also be present in small quantities. "Lemon-scented" eucalyptus oil is obtained from *E. maculata* var. *citriodora* Hook. and contains about 70 per cent. of citronellal. The oil of *E. dives* contains a large proportion of piperitone and is used in the manufacture of thymol. The unmixed oil of *E. Globulus* Labill. is no longer a commercial article. Oil of eucalyptus should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in alcohol (90 per cent.) (3 in 1 or less); very slightly soluble in water; miscible in all proportions with dehydrated alcohol, oils, fats and paraffins.

Standard, B.P.—Oil of eucalyptus contains not less than 70 per cent. w/w of cineole, $C_{10}H_{18}O$. Specific gravity, 0·910 to 0·930. Optical rotation, −5° to +5°. Refractive index at 20°, 1·458 to 1·470. It is soluble in 5 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901). It complies also with limit tests for phellandrene and for aldehydes.

Action and Uses.—Oil of eucalyptus is employed as an antiseptic and deodorant. Internally, it is given in catarrhal inflammation of mucous membranes, especially of the respiratory tract and bladder. Pastilles containing the oil, often with menthol or red gum, are much used in catarrhal colds with sore throat. The oil is sprinkled on the handkerchief and inhaled frequently for catarrhal colds and to prevent infection. Mixed with menthol, camphor, or pine oil it can be inhaled from a "dry" inhaler. The oil is inhaled with steam, sometimes with the addition of menthol, oil of pine and compound tincture of benzoin, to relieve cough in chronic bronchitis and asthma. Oily spray solutions and ointments for use in catarrh are prepared with eucalyptus and pine oils and other ingredients, such as cocaine, menthol, or camphor. It is used in bougies, suppositories and pessaries as an antiseptic and to disguise the smell of iodoform. An ointment containing the oil in soft paraffin (1 in 50) is employed in the treatment of burns as a mild antiseptic dressing. The oil may be administered in capsules or as an emulsion.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

OLEUM EUCALYPTI CHLORINATUM.—Chlorinated oil of eucalyptus may be prepared by treating oil of eucalyptus with potassium chlorate and hydrochloric acid; place oil of eucalyptus, 20 parts, in a wide-mouthed glass bottle, add potassium chlorate, 0·5 part, and hydrochloric acid, 0·5 part, and allow the mixture to stand for about five minutes; add hydrochloric acid, 1·5 parts, in three portions at intervals of about five minutes; shake the mixture in a separator with a slight excess of sodium carbonate solution, separate the chlorinated product, wash it with water until free from alkali, and dry it by means of anhydrous calcium chloride. Chlorinated oil of eucalyptus is used as a solvent for dichloramine.

Preparations

Nebula Eucalypti, B.P.C.—(Neb. Eucalyp.)—Eucalyptus Spray. Oil of eucalyptus, 5 per cent. v/v, in light liquid paraffin.

Unguentum Eucalypti, B.P.C.—(Ung. Eucalyp.) — Eucalyptus Ointment. Eucalyptus oil, 10 per cent., in hard and soft paraffins.

This ointment was included in the British Pharmacopœia, 1914.

Vapor Eucalypti Compositus, B.P.C.—(Vap. Eucalyp. Co.)—Compound Eucalyptus Inhalation. *Syn.*—Anti-catarrhal Salts. Phenol, oil of eucalyptus, and camphor, of each about 1 in 6, oil of Siberian fir and strong solution of iodine, of each about 1 in 12, in ammoniated alcohol.

OLEUM FŒNICULI

(Ol. Fœnic.)

Oil of Fennel

Oil of fennel is obtained by distillation from the dried, ripe fruit of *Fœniculum vulgare* Mill. It occurs as a colourless or slightly yellow liquid, having the characteristic, aromatic odour of fennel and a taste at first bitter and camphoraceous, but afterwards sweetish. The characteristic fennel odour is due to the anethole and fenchone it contains. The chief and most valuable **constituent** of the oil is anethole which crystallises out in the cold. It also contains fenchone, $C_{10}H_{16}O$, a ketone isomeric with camphor and strongly dextrorotatory. The following bodies may also be present in the oil:—Fenchol, *d*-pinene, dipentene, phellandrene and limonene. It should be **stored** in well-stoppered, amber-coloured bottles.

Soluble in alcohol (1 in 5 to 1 in 3).

Standard.—Oil of fennel, determined by the method of the British Pharmacopœia for Oleum Anisi, employing a crystal of congealed oil of anise to start crystallisation instead of previously solidified oil of fennel, has a freezing-point not below 3°. Specific gravity, 0·960 to 1·000. Optical rotation, +4° to +24°. Refractive index at 20°, 1·525 to 1·550. A solution in 8 parts of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640) is neutral to litmus and is not coloured on the addition of a few drops of ferric chloride solution (limit of oils containing phenols).

Action and Uses.—Oil of fennel is an aromatic carminative, and is employed with purgative medicines to prevent gripe and as Aqua Fœniculi in the intestinal colic of children.

Dose.– 0·03 to 0·2 millilitre ($\frac{1}{2}$ to 3 minims).

OLEUM GERANII

(Ol. Geran.)

Oil of Geranium

Synonyms—Oil of Rose Geranium; Oil of Pelargonium.

Oil of geranium is obtained by distillation from the leaves of *Pelargonium odoratissimum* Ait., *P. capitatum* Ait., and *P. Radula* L'Hérit., the plants being cultivated for the purpose in France, Algiers, Spain, Réunion (Bourbon), and Corsica. The oil is found in all green parts of the plants, but the greatest yield is obtained from the leaves. It occurs as a colourless, greenish, or brownish liquid, with a pleasant, rose-like odour. The ester percentage, calculated as geranyl tiglate, in French oils lies between 22 and 29 per cent., in Algerian oils, between 21 and 30 per cent., and in Bourbon oils, usually between 26 and 35 per cent. This oil must not be confused with Indian geranium oil (palmarosa oil), commonly known as Turkish geranium oil, derived from *Cymbopogon Martini*, which contains 85 to 95 per cent. of geraniol and is practically devoid of esters. The chief **constituent** of the oil is geraniol, but citronellol is also present and mixtures of the two alcohols have been described as "rhodinol" and "reuniol"; linalol is present in the lower boiling fractions of the oil.

Standard.—Oil of geranium, determined by the method of the British Pharmacopœia for esters in volatile oils, contains not less than 21 per cent. of ester, calculated as geranyl tiglate; each millilitre of N/2 alcoholic potassium hydroxide is equivalent to 0·1181 gramme of geranyl tiglate, $C_{15}H_{21}O_2$. Specific gravity, (French oil) 0·895 to 0·905, (Algerian oil) 0·894 to 0·904, (Bourbon oil) 0·888 to 0·896. Optical rotation, (French oil) −7° to −11°, (Algerian oil) −7° to −12°, (Bourbon oil) −8° to −14°. Refractive index at 20°, (French oil) 1·465 to 1·470, (Algerian oil) 1·465 to 1·467, (Bourbon oil) 1·462 to 1·467. It is soluble in 3 times its volume of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901).

Uses.—Oil of geranium is largely employed in perfumery and it is frequently used instead of oil of rose for perfuming tooth powders, ointments and other preparations.

GERANIOLUM.—Geraniol, $C_{10}H_{17}OH$, occurs naturally in many essential oils and is obtained commercially mainly from palmarosa oil or from oil of citronella. It occurs as a colourless liquid with a sweet, rose-like odour, having a specific gravity

of about 0·880 and a boiling-point of about 228° to 230°. It is largely used in perfumery.

GERANYLIS ACETAS.—Geranyl acetate, $CH_3 \cdot COOC_{10}H_{17}$, occurs in many essential oils and may be obtained by the esterification of geraniol with acetic acid. It occurs as a colourless liquid with a sweet, lavender-like odour, and has a specific gravity of about 0·917 and a boiling-point of about 242° to 245°. It is largely used in perfumery.

OLEUM GOSSYPII SEMINIS

(Ol. Gossyp. Sem.)

Cottonseed Oil

Cottonseed oil is obtained by expression from the seeds of *Gossypium herbaceum* Linn. and other species of *Gossypium* (Fam. Malvaceæ), the plants being extensively cultivated in the United States of America, Egypt and India. It is refined by a process of partial saponification whereby the dark red colouring matter of the crude oil is carried down as a precipitate by the soap, leaving a pale supernatant oil. Cottonseed oil is a typical semi-drying oil; it occurs as a pale yellow or yellow, almost odourless liquid, with a bland, nutty taste. On cooling cottonseed oil, particles of solid fat separate; they should be re-melted and the oil thoroughly mixed before any of it is used. Cottonseed oil may be identified and its presence in other oils detected, provided it has not been previously heated to 200°, by means of the following colour reaction, which is known as the Halphen test:—The oil is mixed with an equal volume of a mixture containing equal proportions of amyl alcohol and a 1 per cent. w/v solution of precipitated sulphur in carbon disulphide; on heating the mixture in a securely-closed strong-walled tube by partial immersion in boiling water, a pink colouration appears in mixtures containing 5 per cent. or less of cottonseed oil in from ten to fifteen minutes. When cottonseed oil is shaken with an equal volume of nitric acid of specific gravity 1·375 and allowed to stand for some time, up to twenty-four hours, a characteristic, coffee-brown colouration is produced. Cottonseed oil **contains** the glycerides of palmitic, stearic, oleic and linolic acids.

Standard, B.P.—Cottonseed oil has a specific gravity of 0·920 to 0·925. Refractive index at 40°, 1·4645 to 1·4655. Acid value, not more than 0·5. Saponification value, 190 to 198. Iodine value, 103 to 115. Particles of solid fat separate at temperatures below 12°, and the oil congeals at temperatures between 0° and −5°. It complies also with tests for the absence of alkali, sesame oil and arachis oil.

Action and Uses.—Cottonseed oil is employed similarly to olive oil in preparations for external use. It may be sterilised by heating at 150° for one hour. High grade cottonseed oil is largely used as salad oil.

Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

OLEUM GRAMINIS CITRATI

(Ol. Gram. Citrat.)

Oil of Lemon Grass

Synonyms—Indian Oil of Verbena; Indian Melissa Oil.

Oil of lemon grass is obtained by distillation from *Cymbopogon citratus* Stapf and *C. flexuosus* Stapf, the former being widely cultivated in India, Ceylon, the Straits Settlements, West Indies and other tropical countries, and the latter being indigenous to India. This oil is used largely under the name of oil of verbena. True oil of verbena is obtained from *Lippia citriodora* H. B. and K., which is cultivated in the South of France. The oil is distilled from the leaves and contains less citral, but has a much more delicate odour than oil of lemon grass, from which it should be distinguished. Oil of lemon grass occurs as a reddish-yellow or brownish-red, mobile liquid, having a very strong odour, resembling that of verbena. West Indian oil is lighter (specific gravity, 0·878 to 0·882), although it contains a high percentage of citral; it is less soluble in alcohol owing to the presence of an olefinic terpene which rapidly resinifies. Oil of lemon grass **contains** citral, $C_{10}H_{16}O$, an optically inactive aldehyde, which may be present to the extent of 75 to 85 per cent. The oil also contains traces of an isomeride of citral, geraniol, $C_{10}H_{18}O$, methylheptenone, $C_8H_{14}O$, traces of citronellal, $C_{10}H_{18}O$, possibly linalol, and the terpenes limonene and dipentene, together with a trace of cymene.

Standard.—Oil of lemon grass, determined by the method of the British Pharmacopœia for aldehydes in Oleum Cinnamomi, contains not less than 75 per cent. w/w of citral, $C_{10}H_{16}O$; each millilitre of N/2 potassium hydroxide in alcohol (60 per cent.) is equivalent to 0·07667 gramme of citral. Specific gravity, 0·895 to 0·908. Optical rotation, −4° to +1°. Refractive index at 20°, 1·483 to 1·489. It is soluble in three times its volume of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901), sometimes becoming opalescent on dilution to 10 volumes.

Action and Uses.—Oil of lemon grass was formerly given internally as a carminative; it is now used mainly in perfumery and as a source of citral.

Dose.– 0·03 to 0·2 millilitre (½ to 3 minims).

CITRALUM.—Citral, or geranaldehyde, is a mixture of two isomeric aldehydes of the formula $C_{10}H_{16}O$, and is the characteristic odorous substance in oil of lemon. It occurs in numerous essential oils and is obtained commercially from oil of lemon grass. It occurs as a pale yellow oil, having a specific gravity of about 0·897 and a boiling point of 224° to 228°. It is occasionally employed in perfumery, but its principal use is as the starting-point for the manufacture of ionone.

OLEUM HIPPOGLOSSI
(Ol. Hippogloss.)

Halibut-liver Oil

Halibut-liver oil is the oil obtained from the liver of the halibut, *Hippoglossus hippoglossus* Linn. It cannot be obtained in any quantity by steaming the livers as in the case of cod-liver oil, but may be prepared by extracting the dried livers with a volatile solvent and removing the solvent at a low temperature. It occurs as a pale yellow oil, with a slightly fishy odour and taste. The important characteristic of halibut-liver oil is its high content of vitamin A, of which it may contain 100 times as much as cod-liver oil, or even more. It usually contains about 2000 units of vitamin D per gramme. The following are the usual analytical figures:—Specific gravity, 0·922 to 0·925; refractive index at 40°, 1·470 to 1·478; saponification value, 170 to 180; iodine value, 120 to 136; unsaponifiable matter, 8 to 13 per cent.; blue value (antimony trichloride colour test), 400 to 3000. It is frequently adjusted by the addition of cod-liver oil or a suitable vegetable oil in order to produce a product of lower and more uniform vitamin A content, containing about 60 times that of cod-liver oil; vitamin D is also added to raise the vitamin D content to about 250 times that of cod-liver oil.

Action and Uses.—Halibut-liver oil is used in place of cod-liver oil as a means of administering the vitamins A and D. It may be **administered** in capsules or in association with malt extract.

Dose.– 0·12 to 0·3 millilitre (2 to 5 minims).

OLEUM HYDNOCARPI
(Ol. Hydnocarp.)

Hydnocarpus Oil

Hydnocarpus oil is a fatty oil obtained by cold expression from the fresh, ripe seeds of *Hydnocarpus Wightiana* Blume, a native of India It occurs as a yellowish or brownish-yellow oil, or as a soft, cream-coloured fat. It has a slight, characteristic odour and a somewhat acrid taste. Hydnocarpus oil **contains** the glycerides of chaulmoogric acid, $C_{18}H_{32}O_2$, and of hydnocarpic acid, $C_{16}H_{28}O_2$, which differ in structure from the acids usually occurring in oils and fats by containing a partly reduced cyclopentane nucleus with a side chain of many carbon atoms. Hydnocarpus oil should be **stored** in well-closed containers in a cool place and protected from light.

Partly **soluble** in cold alcohol (90 per cent.); almost completely soluble in hot alcohol (90 per cent.); miscible with ether, chloroform and carbon disulphide.

Standard, B.P.—Hydnocarpus oil has a specific gravity (25°/25°) of 0·950 to 0·960. Melting-point, 20° to 25°. Specific rotation in a 10 per cent. w/v solution in chloroform, not less than +53°. Refractive index at 40°, 1·472 to 1·476. Acid value, not more than 25. Saponification value, 198 to 204. Iodine value, 97 to 103.

Action and Uses.—Hydnocarpus oil has properties similar to those of chaulmoogra oil, and has almost entirely replaced the latter in the treatment of leprosy. It is **administered** orally and by injection, 3 per cent. of creosote being sometimes added as an antiseptic. Hydnocarpus oil for **injection** may be sterilised by heating at 150° for one hour.

Dose.– 0·3 to 1 millilitre (5 to 15 minims) increased gradually to 4 millilitres (60 minims), by the mouth; 2 millilitres (30 minims) increased gradually to 5 millilitres (75 minims), by subcutaneous and intramuscular injection.

OLEUM HYDNOCARPI ÆTHYLICUM

(Ol. Hydnocarp. Æth.)

Ethyl Esters of Hydnocarpus Oil

Ethyl esters of hydnocarpus oil may be prepared by direct or indirect esterification of the total acids of hydnocarpus oil. The crude mixture of ethyl esters is washed with a solution of sodium carbonate and purified by distillation under reduced pressure. It occurs as a colourless or faintly yellow, limpid oil, with a characteristic odour and a slightly acrid taste. The esterified oil of *Hydnocarpus anthelmintica* Pierre, used in Siam and China, and ethyl chaulmoograte are products analagous to ethyl esters of hydnocarpus oil and are used for the same purposes. They are derived from oils allied to that of *H. Wightiana* and are indistinguishable in appearance, odour and taste from the official esterified oil, but differ from it chiefly in having a somewhat lower optical rotation and iodine number. Ethyl esters of hydnocarpus oil **contains** the ethyl esters of chaulmoogric and hydnocarpic acids. It should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in not less than 6 volumes of cold alcohol (90 per cent.); miscible with ether, chloroform and carbon disulphide.

Standard, B.P.—Ethyl esters of hydnocarpus oil has a specific gravity of 0·905 to 0·910. Optical rotation, not less than +45°. Refractive index at 20°, 1·458 to 1·462. Acid value, not greater than 1·0. Saponification value, 190 to 196. Iodine value, 88 to 94.

Action and Uses.—Ethyl esters of hydnocarpus oil has the properties of hydnocarpus oil and is generally preferred to the latter in the treatment of leprosy. It is **administered** intravenously, intramuscularly, or subcutaneously. Ethyl esters of hydnocarpus oil for **injection** may be sterilised by heating in an autoclave or by tyndallisation.

Dose.– 0·3 to 1 millilitre (5 to 15 minims), increased gradually to 4 millilitres (60 minims), by the mouth; 2 millilitres (30 minims), increased gradually to 5 millilitres (75 minims), by subcutaneous and intramuscular injection.

OLEUM JUNIPERI
(Ol. Junip.)
Oil of Juniper

Oil of juniper (English oil) consists of the entire distillate from the dried, ripe fruit of *Juniperus communis* Linn. and possesses to a high degree the characteristic odour and flavour of the crushed fruit. Foreign oil (Hungarian oil), which contains a larger proportion of the lighter constituents, has a less pronounced juniper odour and flavour. Commercial oil of juniper (so called), a third quality, is obtained as a by-product in the manufacture of an alcoholic liqueur (Borowicka) and of a juniper extract, for which there is a considerable demand. The physical and chemical tests for this product conform so closely to those of normal juniper oil that it is largely used to replace the latter; it may, however, be distinguished by its odour, which is more like turpentine than juniper. The commercial oil is sometimes distilled from a mixture of fruit obtained from *Juniperus Oxycedrus* and *J. communis*. Oil of juniper is a colourless or pale greenish-yellow, limpid liquid, with a characteristic odour and a burning, somewhat bitter taste. It **contains** pinene, $C_{10}H_{16}$, camphene, $C_{10}H_{16}$, cadinene, $C_{15}H_{24}$, terpinenol, $C_{10}H_{18}OH$, and juniper camphor, a crystalline body, which is probably an alcohol of the terpene series. The characteristic odour of juniper is due to a substance which has not been identified.

Soluble, when freshly distilled, in 4 volumes of alcohol (95 per cent.) with not more than a slight opalescence. The oil becomes less soluble and more viscid on storing; miscible in all proportions with chloroform, benzene, carbon disulphide and amyl alcohol.

Standard.—Oil of juniper has a specific gravity of (English oil) 0·870 to 0·890, (Hungarian oil) 0·865 to 0·895. Optical rotation, (English oil) +1° to −10°, (Hungarian oil) −5° to −15°. Refractive index at 20°, (English oil) 1·476 to 1·479, (Hungarian oil) 1·479 to 1·484.

Action and Uses.—Oil of juniper is employed chiefly as a diuretic and urinary antiseptic, but it should not be given when there is renal disease. It is also used as a carminative in flatulence and colic and in the treatment of lumbago. Its irritant properties during excretion cause reflex contractions of the uterus, and the drug has been used as an emmenagogue. The oil is **administered** on sugar, or in capsules, or as Spiritus Juniperi.

Dose.– 0·03 to 0·2 millilitre ($\frac{1}{2}$ to 3 minims).

Preparation

Spiritus Juniperi, B.P.C.—(Sp. Junip.)—Spirit of Juniper. Oil of juniper, 1 in 10, in alcohol (90 per cent.). Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

This spirit was included in the British Pharmacopœia, 1914.

OLEUM LAVANDULÆ

(Ol. Lavand.)

Oil of Lavender

Oil of lavender is obtained by distillation from the fresh flowering tops of *Lavandula officinalis* Chaix, a plant cultivated in England, France and elsewhere. It occurs as a colourless, pale yellow or yellowish-green liquid, having the fragrant odour of the flowers and a pungent, slightly bitter taste. Oil of lavender **contains** chiefly the alcohol linalol, $C_{10}H_{18}O$, and its acetic ester, linalyl acetate; other constituents are pinene, limonene, geraniol and a sesquiterpene. Cineole occurs in some quantity in English oil, but only in traces in French oil. English oil, which undoubtedly has the finer odour, contains but little linalyl acetate, but the fineness and value of French oils appear to stand in direct ratio to the amount of linalyl acetate present. The English oil is sometimes described as being easily distinguishable from the French by its cineole-like odour. The usual adulterants of oil of lavender are oil of spike lavender and artificial esters such as ethyl citrate and ethyl phthalate. Oil of spike lavender decreases the ester content and increases the percentage of cineole. Oil of lavender should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in all proportions of alcohol (90 per cent.).

Standard, B.P.—Oil of lavender (English oil) contains not less than 7 per cent. and not more than 14 per cent. w/w, and oil of lavender (foreign oil) contains not less than 35 per cent. w/w of esters, calculated as linalyl acetate, $C_{12}H_{20}O_2$. Specific gravity, (English oil) 0·882 to 0·900, (foreign oil) 0·883 to 0·895. Optical rotation, (English oil) —3° to —10°, (foreign oil) —3° to —10°. Refractive index at 20°, (English oil) 1·459 to 1·470, (foreign oil) 1·459 to 1·464. It is soluble in 4 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901), the solution being not more than slightly opalescent.

Action and Uses.—Oil of lavender has carminative properties but is not much employed internally except as a flavouring agent; the oil itself, or Spiritus Lavandulæ, may be **administered** on sugar in flatulence and colic; lavender lozenges are employed as a mild stimulant and for their pleasant taste. Tinctura Lavandulæ Composita is used as a carminative and antispasmodic and as a colouring and flavouring agent. Oil of lavender is largely employed in perfumery and is used occasionally to cover disagreeable odours in ointments and other preparations. The

oil is used as an insect repellant and, for this purpose, is smeared on exposed parts of the skin.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

Preparations

Spiritus Lavandulæ, B.P.C.—(Sp. Lavand.)—Spirit of Lavender. Oil of lavender, 1 in 10, in alcohol (90 per cent.). Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

This spirit was included in the British Pharmacopœia, 1914.

Spiritus Lavandulæ Compositus, B.P.C.—(Sp. Lavand. Co.)—Compound Spirit of Lavender. *Syn.*—Aqua Lavandulæ. Oils of lavender, bergamot, clove, peppermint and rose, with spirit of nitrous ether, alcohol (90 per cent.) and distilled water.

Tinctura Lavandulæ Composita, B.P.C.—(Tinct. Lavand. Co.)—Compound Tincture of Lavender. Oil of lavender, 1 in 200, with oil of rosemary, cinnamon, nutmeg and red sanders wood. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

OLEUM LAVANDULÆ SPICATÆ

(Ol. Lavand. Spic.)

Oil of Spike Lavender

Oil of spike lavender is the oil obtained by distillation from the flowering herb, *Lavandula latifolia* Vill., and other species of *Lavandula*, which grow in the lower mountainous and hilly coastal districts of France, Spain and Italy. It occurs as a colourless or pale yellow liquid, having an odour of lavender combined with that of cineole. It contains linalol, camphor, borneol, cineole (about 33 per cent.), terpineol, *d*-camphene and a sesquiterpene.

Standard.—Oil of spike lavender, determined by the method of the British Pharmacopœia for the determination of free alcohols in volatile oils, contains not less than 30 per cent. of free alcohols, calculated as linalol, using the factor, y = 154·1. Specific gravity, 0·900 to 0·920. Optical rotation, −4° to +6°. Refractive index at 20°, 1·462 to 1·469. It is soluble in 3 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901) and in 6 volumes of alcohol (65 per cent.; specific gravity, 0·9018 to 0·9022).

Action and Uses.—Oil of spike lavender resembles oil of lavender in its properties. It is often used in perfumery for the same purposes and as an application to the exposed parts of the skin to prevent insect bites.

OLEUM LIMONIS
(Ol. Limon.)
Oil of Lemon

Oil of lemon is obtained by expression from lemon peel. It occurs as a pale yellow or greenish-yellow liquid, with a characteristic odour and a warm, aromatic, slightly bitter taste. Oil of lemon **contains** chiefly *d*-limonene, which together with terpinene and phellandrene forms about 90 per cent. of the bulk of the oil. The valuable portion of the oil is the remaining 10 per cent. which contains oxygenated bodies, chiefly the aldehyde citral, $C_{10}H_{16}O$, to which the odour of the oil is largely due. The oxygenated bodies have a flavouring power much greater than that of the oil but inferior in quality. Citral boils at 224° to 228° and has a specific gravity of 0·895 to 0·899; on reduction it yields geraniol. Other oxygenated constituents are citronellal, $C_{10}H_{18}O$, geranyl acetate, about 1 per cent. and, in Palermo oil, linalyl acetate, $C_{12}H_{20}O_2$. From the stearoptene found in the oil, two crystalline substances have been isolated, one a yellow, crystalline body, $C_{14}H_{14}O_6$, melting-point, 115°; the other a white, crystalline solid, $C_{10}H_{10}O_4$, melting-point, 144°. Adulteration with turpentine oils decreases the optical rotation; turpentine may also be detected in the first fraction of about 10 per cent., since pinene, its chief constituent, boils at 156° whereas pure oil of lemon begins to boil at about 173°. Other forms of adulteration are exceedingly difficult to detect, such as admixture with terpenes and low-grade orange oil, and sometimes citral obtained from oil of lemon grass. Determinations of citral can only give approximate results and the result is no proof of the quality of the oil. The non volatile residue is usually from 2 to 3 per cent. w/w. Oil of lemon should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in alcohol (90 per cent.) (1 in 12), but the solution is frequently opalescent, owing to the presence of gummy constituents or stearoptenes; miscible in all proportions with dehydrated alcohol, ether, chloroform, benzene, amyl alcohol and glacial acetic acid; solutions in carbon disulphide or benzene are usually somewhat cloudy on account of a little water contained in the oil.

Standard, B.P.—Oil of lemon contains not less than 4 per cent. w/w of aldehydes, calculated as citral, $C_{10}H_{16}O$. Specific gravity, 0·857 to 0·861. Optical rotation, +57° to +65°. Refractive index at 20°, 1·474 to 1·476.

Action and Uses.—Oil of lemon has carminative properties, but is seldom employed internally except as a flavouring agent. It is also known as essence of lemon. For culinary purposes an alcoholic solution (1 in 10) is sometimes sold as "essence of lemon," but this should be distinguished as "prepared essence of lemon."

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

OLEUM LIMONIS DETERPENATUM

(Ol. Limon. Deterpenat.)

Terpeneless Oil of Lemon

Terpeneless oil of lemon is prepared by concentrating oil of lemon *in vacuo* until nearly all the terpenes have been removed, and rectifying the product by steam distillation. A more soluble oil may be prepared by further fractional distillation, whereby the sesquiterpenes are also removed. This more soluble oil is known as "terpene- and sesquiterpene-free." Terpeneless oil of lemon consists mainly of citral, with considerable quantities of esters, chiefly geranyl and linalyl acetates.

Standard.—Terpeneless oil of lemon, determined by the method of the British Pharmacopœia for aldehydes in Oleum Limonis, using 1 gramme for the determination, contains not less than 40 per cent. and not more than 50 per cent. w/w of citral. Specific gravity, 0·890 to 0·905. Optical rotation, —4° to —9°. Refractive index at 20°, 1·479 to 1·483. It is soluble in 3 volumes of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640).

Uses.—Terpeneless oil of lemon is used almost exclusively as a flavouring agent, and has the advantages of being stronger in flavour and perfume than the natural oil and more readily soluble. One fluid ounce of the terpeneless oil is equivalent in flavour to about twenty fluid ounces of oil of lemon; a 1 per cent. v/v solution in alcohol (70 per cent.) is generally used for culinary purposes.

OLEUM LINI

(Ol. Lini)

Linseed Oil

Linseed oil is obtained by cold expression from linseed, and subsequent clarification. It occurs as a yellowish-brown liquid, with a faint, characteristic odour and a bland taste. The commercial oil often has a marked odour and an acrid taste, due to oxidation from exposure to air. It gradually thickens when exposed to the air and a thin film of the oil dries to a hard, transparent varnish. It does not congeal when cooled to —20°. Linseed oil **contains** principally a mixture of the glycerides of linolic, linolenic and *iso*linolenic acids, three bodies possessing similar physical properties and described generally as linoleic acid. Other constituents are the glycerides of oleic, stearic, palmitic and myristic acids. Freedom from non-drying oils is indicated by the formation of a hard varnish on exposure to the air, and the absence of mineral oil and resin oil is indicated by the low figure for unsaponifiable matter. Boiled linseed oil is linseed oil which has been heated with litharge or other suitable "driers", such as manganese resinate, to a temperature of about

150° so that metallic salts of the fatty acids are formed and cause the oil to dry more quickly; it must not be employed in place of linseed oil.

Soluble in dehydrated alcohol (1 in 40), slightly soluble in alcohol (90 per cent.); miscible in all proportions with turpentine, ether, chloroform, carbon disulphide and light petroleum (boiling-point, 50° to 60°).

Standard, B.P.—Linseed oil has a specific gravity of 0·930 to 0·940. Refractive index at 40°, 1·4725 to 1·4750. Acid value, not more than 5·0. Saponification value, 187 to 195. Unsaponifiable matter not more than 1·5 per cent. Iodine value, 170 to 200. It complies also with tests for the absence of resin and resin oils and of cottonseed oil, sesame oil and arachis oil.

Action and Uses.—Linseed oil has been used internally as a laxative, but its taste is disagreeable. A rectal injection of 60 millilitres (2 fluid ounces) of the oil, given night and morning, has been used in the treatment of piles. It is applied externally as a soothing application for burns, especially in the form of Linimentum Calcii Hydroxidi cum Oleo Lini. Linseed oil has been **administered** in the form of an emulsion which in combination with diluted milk has been used as a substitute for cream. On account of the absence of the antirachitic vitamin it is inferior to Emulsio Olei Arachis [Marylebone cream (improved)]. Linseed oil and boiled linseed oil are used largely in the arts as drying oils.

Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

Preparation

Linimentum Calcii Hydroxidi cum Oleo Lini, B.P.C.—(Lin. Calc. Hydrox. c. Ol. Lini)—Liniment of Calcium Hydroxide with Linseed Oil. *Syn.*—Lime Water and Oil; Carron Oil; Linimentum Calcis cum Oleo Lini. Linseed oil and solution of calcium hydroxide, equal parts.

OLEUM MENTHÆ PIPERITÆ

(Ol. Menth. Pip.)

Oil of Peppermint

Oil of peppermint is obtained by distillation from the fresh flowering tops of *Mentha piperita* Linn. Both the black and the white varieties are used, the former yielding more oil than the latter, but of a less delicate aroma. The oil is rectified if necessary. It occurs as a pale yellow or greenish-yellow liquid, with a characteristic odour and a pungent aromatic taste followed by a sensation of coldness in the mouth. It darkens in colour and becomes viscid on keeping. Oil of peppermint **contains** menthol, menthyl acetate, $C_{12}H_{22}O_2$, menthyl *iso*valerate, together with menthone, $C_{10}H_{18}O$, cineole, inactive pinene, *l*-limonene, cadinene, phellandrene, acetaldehyde, acetic acid, *iso*valeric

aldehyde and acid, amyl alcohol and dimethyl sulphide. On cooling to a low temperature, separation of menthol occurs, especially when a few crystals of that substance are added to start crystallisation.

Japanese and Chinese peppermint oils, obtained from *Mentha arvensis* DC. var. *piperascens* Holmes and var. *glabrata* Holmes, are the richest of all in menthol, sometimes containing 85 per cent. The oil of *M. piperita* may be distinguished from that of *M. arvensis* by the following colour reaction: Mix 3 drops of the oil with 5 millilitres of glacial acetic acid containing 0·3 per cent. v/v of nitric acid, and heat the mixture in boiling water; the oil from *M. piperita* gives a blue colouration in from one to five minutes and on heating further, the colour deepens, showing a copper-coloured fluorescence, and then fades to a golden-yellow; with Japanese oil, the mixture remains colourless. Besides the specific gravity and optical rotation, the only really useful methods of analysis are the determination of the menthol, both free and as esters, and of the menthone, the latter by reduction to menthol with sodium in a solution of the oil in alcohol. Adulteration with dementholised oil, known as menthene, is sometimes practised. The odour and taste afford the best indication of the quality of the oil and by this means it is quite possible to distinguish between English, American and Japanese oils. Many Italian and some American peppermint oils have a specific gravity up to 0·915. Oil of peppermint should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in alcohol (90 per cent.) (2 in 1), the solution sometimes becoming turbid on adding more of the solvent; miscible with dehydrated alcohol.

Standard, B.P.—Oil of peppermint contains not less than 4·5 per cent. and not more than 9 per cent. w/w of esters, calculated as menthyl acetate, $C_{12}H_{22}O_2$, and not less than 46 per cent. w/w of free menthol, $C_{10}H_{20}O$. Specific gravity, 0·902 to 0·910. Optical rotation, −18° to −32°. Refractive index at 20°, 1·460 to 1·470. It is soluble in 4 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901), the solution being not more than slightly opalescent, but becoming less soluble with age. It complies also with a test distinguishing it from Japanese mint oil.

Action and Uses.—Oil of peppermint is an aromatic stimulant, and carminative. It relieves gastric and intestinal flatulence and colic, and is employed with purgatives to prevent griping. The oil acts as a local anæsthetic. Oil of peppermint may be **administered** on sugar, or in mixtures as peppermint water or spirit of peppermint. Peppermint lozenges are used as a mild carminative and for their pleasant taste. Oil of peppermint has mildly antiseptic properties and is used to flavour dental pastes, powders and washes.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

Preparations

Emulsio Menthæ Piperitæ, B.P.C.—(Emuls. Menth. Pip.)—Emulsion of Peppermint. Oil of peppermint, 1 in 10, with tincture of quillaia and distilled water. Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

Spiritus Menthæ Piperitæ, B.P.—(Sp. Menth. Pip.)—Spirit of Peppermint. *Syn.*—Essence of Peppermint. Oil of peppermint, 10 per cent. v/v, in alcohol (90 per cent.). Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Syrupus Menthæ Piperitæ, B.P.C.—(Syr. Menth. Pip.)—Syrup of Peppermint. Concentrated peppermint water, 1 in 8, in syrup. Dose.– 2 to 8 millilitres ($\frac{1}{2}$ to 2 fluid drachms).

OLEUM MENTHÆ VIRIDIS
(Ol. Menth. Vir.)

Oil of Spearmint

Synonym—Oleum Menthæ Crispæ.

Oil of spearmint is obtained by distillation from fresh, flowering spearmint, *Mentha viridis* Linn. and *M. crispa* Roth., grown in Europe and America, most of the oil of commerce being imported from North America. It occurs as a colourless, pale yellow or greenish-yellow liquid when recently distilled, but becomes darker and viscid on keeping; it has the characteristic odour and warm, slightly bitter taste of spearmint. The oil **contains** carvone, which may occur to the extent of from 42 to 60 per cent., an alcohol, *l*-limonene and *l*-pinene.

Standard.—Oil of spearmint, determined by the method of the British Pharmacopœia for Oleum Cari, contains not less than 42 per cent. of carvone. Specific gravity, 0·920 to 0·940. Optical rotation, —34° to —55°. Refractive index at 20°, 1·483 to 1·490. It is soluble in three times its volume of alcohol (90 per cent.; specific gravity, 0·8334 to 0·8340).

Action and Uses.—The properties of oil of spearmint resemble those of peppermint oil. It is used as a flavouring agent and carminative.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

OLEUM MORRHUÆ
(Ol. Morrh.)

Cod-liver Oil

Synonym—Oleum Jecoris Aselli.

Cod-liver oil is the fixed oil expressed from the fresh liver of the cod, *Gadus morrhua* Linn. (Order Teleostei), by the application of low-pressure steam at a temperature not exceeding 85°, after which it is cooled to about 0° and filtered to remove the separated fat. It occurs as a pale yellow liquid with a slightly fishy, but not rancid, odour, and a bland, slightly fishy taste. Inferior or old oils are liable to be dark-coloured, acrid or bitter, unduly acid, and more or less rancid, but if properly

stored cod-liver oil retains its potency and characters for many years; the vitamin A is rapidly destroyed on exposure to sunlight in colourless or lightly tinted glass bottles. On exposure to the air the oil absorbs a considerable amount of oxygen and becomes thicker, but does not dry to a hard varnish.

The most important medicinal constituents of the oil are the vitamins A and D, but it **contains** a large proportion of unsaturated fatty glycerides, largely those of clupanodonic acid, $C_{22}H_{34}O_2$, and of a highly unsaturated acid containing 18 or 20 carbon atoms. Glycerides of oleic acid are probably absent, but those of palmitic and stearic acids occur in small quantity. The unsaponifiable matter consists largely of cholesterol with small quantities of batyl alcohol, a hydrocarbon, and the vitamins A and D. Statements have been made that various elements, especially iodine, are present in the oil. These were probably impurities; medicinal oil at the present time contains not more than the very smallest trace of iodine. When a statement is made of the number of units of vitamin D in cod-liver oil, the unit referred to should be the unit of antirachitic activity (vitamin D) defined in the British Pharmacopœia. The vitamin D activity of cod-liver oil varies from about 50 to 250 units per gramme, the average being about 100 units. The vitamin A content varies very widely in different samples. An average sample of oil may contain about 2000 units per gramme, the unit being that described under Liquor Vitaminæ-A. The "blue value" of cod-liver oil is the number of blue tintometer units given by a 20 per cent. w/v solution of the oil in chloroform in the antimony trichloride test, calculated from the concentration of the oil which gives a reading of 5 blue units in the tintometer. The "blue value" of cod-liver oil varies from about 6 to about 50, the average being about 15. Cod-liver oil should be **stored** in completely-filled, well-closed containers and protected from light.

Slightly **soluble** in alcohol (90 per cent.); miscible with ether, light petroleum, carbon disulphide and chloroform.

Standard, B.P.—Cod-liver oil has a specific gravity of 0·922 to 0·929. Refractive index at 40°, 1·4705 to 1·4745. Acid value, not greater than 1·2. Saponification value, 180 to 190. Unsaponifiable matter, not more than 1·5 per cent. Iodine value, 155 to 173. It remains bright when maintained at 0° for three hours, and it complies with the antimony trichloride limit test for the presence of vitamin A.

Action and Uses.—Cod-liver oil is a food rather than a drug, and is the most easily assimilable of all oils. It increases weight and improves the general condition of the patient, being often well borne by those who are unable to digest fats. Not only does the oil increase the total absorption of fat but also the percentage absorption of all fats taken, and it influences favourably the retention of nitrogen. It may be that the unsaturated character of the fats is an important factor, since one function of the liver is the preparation of fatty acids in a high degree of unsaturation for the further processes of metabolism. The medicinal virtues of cod-liver oil are, however, in the main due to the relatively

large amounts of vitamin A (growth promoting and anti-infective) and vitamin D (antirachitic) present in the oil. The antirachitic factor can be produced by irradiation of ergosterol with a mercury vapour lamp; such preparations, suitably flavoured and admixed, are widely used in place of cod-liver oil and its preparations. Cod-liver oil is employed to improve nutrition and promote calcification in wasting diseases, such as tuberculosis and rickets, and in the treatment of the irritating cough due to enlarged mediastinal glands. It is of the greatest service in the malnutrition of children and is best given in the cold months of the year, since a distaste for the oil frequently arises in the summer months. It should not, moreover, be given when there is diarrhœa. Externally, the oil is sometimes applied by inunction with good results, especially to young infants. Cod-liver oil may be administered in the form of emulsion or as Extractum Malti cum Oleo Morrhuæ when the plain oil causes nausea. Emulsions are also prepared with the hypophosphites of calcium and sodium for use in phthisis.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

VITAMIN A AND D CONCENTRATES.—A concentrate containing vitamin A and vitamin D may be prepared from cod-liver oil by saponification with alcoholic potash, extraction of the unsaponifiable matter with ether, and the removal of cholesterol from the ether-soluble fraction as described under Liquor Vitaminæ-A. An average sample of cod-liver oil contains about 2000 units of vitamin A and about 100 units of vitamin D per gramme. Since the unsaponifiable matter of cod-liver oil constitutes about 1 per cent. of the oil and the unsaponifiable fraction, with the cholesterol removed, about 0·5 per cent., the vitamin A and D potencies of a cod-liver oil concentrate is approximately 200 times that of the original oil. The vitamin A content of different samples of cod-liver oil varies very considerably and the vitamin D content may vary from about 50 to 250 units per gramme; the vitamin content of the concentrate may vary, therefore, within somewhat wide limits. The vitamin A potency of halibut-liver oil is stated to be about 60 times that of an average cod-liver oil and the vitamin D potency about 20 times (see Oleum Hippoglossi). The vitamin A and D potencies of a concentrate may be determined by biological assay and some guide to the vitamin A potency may also be obtained by means of the antimony trichloride reaction (see Liquor Vitaminæ-A).

Solutions of vitamin A and D concentrates in arachis oil suitable for administration may be prepared, and adjusted to the required strength by the addition of vitamin A concentrate obtained from mammalian liver and calciferol or irradiated ergosterol prepared by the ultra-violet irradiation of ergosterol. Concentrates of vitamins are employed in the manufacture of certain margarines and other foodstuffs in which an added vitamin content is an advantage. They are also used to administer vitamins A and D in a more concentrated form than in cod-liver oil itself and may be given in tablets, or as Extractum Malti cum Vitaminis which contains about 3000 units of vitamin A and about 225 units of vitamin D in 4 millilitres (1 fluid drachm).

Preparations

Emulsio Olei Morrhuæ, B.P.C.—(Emuls. Ol. Morrh.)—Emulsion of Cod-Liver Oil. It contains 50 per cent. v/v of cod-liver oil. Dose.– 8 to 30 millilitres (½ to 1 fluid ounce).

Emulsio Olei Morrhuæ cum Glycerophosphatibus, B.P.C.—(Emuls. Ol. Morrh. c. Glycerophosph.)—Emulsion of Cod-liver Oil with Glycerophosphates. It contains 50 per cent. v/v of cod-liver oil, with the glycerophosphates of calcium, iron, magnesium, potassium and sodium. Dose.– 8 to 30 millilitres (½ to 1 fluid ounce).

Emulsio Olei Morrhuæ cum Hypophosphitibus, B.P.C.—(Emuls. Ol. Morrh. c. Hypophosph.)—Emulsion of Cod-liver Oil with Hypophosphites. *Syn.*—Emulsio Olei Morrhuæ Composita; Compound Emulsion of Cod-liver Oil. It contains 50 per cent. v/v of cod-liver oil with 1 grain each of the hypophosphites of calcium and sodium in each fluid ounce. Dose.– 8 to 30 millilitres (½ to 1 fluid ounce).

Emulsio Olei Morrhuæ et Creosoti, B.P.C.—(Emuls. Ol. Morrh. et Creosot.)—Emulsion of Cod-liver Oil and Creosote. It contains 33·3 per cent. v/v of cod-liver oil with 4 minims of creosote in each fluid ounce. Dose.– 8 to 30 millilitres (½ to 1 fluid ounce).

Extractum Malti cum Oleo Morrhuæ, B.P.—(Ext. Malt. c. Ol. Morrh.)—Extract of Malt with Cod-liver Oil. Cod-liver oil, 10 per cent. w/w, in extract of malt. It contains approximately 15 per cent. v/v of cod-liver oil; 16 millilitres contains about 2·5 millilitres, and 4 fluid drachms contains about 36 minims, of cod-liver oil. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

This extract was included in the British Pharmaceutical Codex, 1923.

Unguentum Zinci Morrhuatis, B.P.C.—(Ung. Zinc. Morrh.)—Zinc Morrhuate Ointment. Cod-liver oil, about 14 per cent., and zinc oxide, about 32 per cent., with solution of calcium hydroxide, purified talc and balsam of Peru, in beeswax, wool fat and white soft paraffin.

OLEUM MYRCIÆ

(Ol. Myrc.)

Oil of Bay

Oil of bay is obtained by distillation from the leaves of *Pimenta acris* Wight, and probably other closely allied species, plants flourishing in the West Indies, especially in St. Thomas, Jamaica, etc. The oil is distilled into water, where it separates into two portions—a light fraction, distilling over rapidly, and a heavy fraction, distilling more slowly, the former floating on the top of the water, the latter sinking. These are mixed to obtain a normal oil. Oil of bay occurs as a yellow liquid rapidly becoming brown on exposure to the air, having a pleasant, characteristic odour and a sharp, spicy taste. A semi-solid mass is produced when the oil is mixed with an equal volume of strong sodium hydroxide solution. On the addition of ferric chloride solution to a 2 per cent. solution of the oil in alcohol, a light green colour is produced. Oil of bay **contains** eugenol, $C_{10}H_{12}O_2$, myrcene, $C_{10}H_{16}$, chavicol, $C_9H_{10}O$, methyleugenol, $C_{11}H_{14}O_2$, methylchavicol, $C_{10}H_{12}O$, *l*-phellandrene, $C_{10}H_{16}$, and citral, $C_{10}H_{16}O$. Myrcene, on treatment with glacial acetic acid and sulphuric acid, yields dipentene and an oil with a lavender-like odour, which yields linalol after saponification, identified by its conversion into citral. Myrcene, therefore, bears the same relation to linalol as camphene to *iso*borneol, and pinene or dipentene to terpineol.

Soluble, when freshly distilled, in an equal volume of alcohol (95 per cent.) forming a clear solution which becomes cloudy on further dilution. On keeping, however, the oil becomes less soluble and it then gives only turbid mixtures with alcohol. This is due to polymerisation of the olefinic terpene, myrcene.

Standard.—Oil of bay, determined by the method of the British Pharmacopœia for eugenol in Oleum Caryophylli, contains not less than 45 per cent. of phenols. Specific gravity, 0·945 to 0·990. Optical rotation, 0° to −4°. Refractive index at 20°, 1·500 to 1·520.

Uses.—Oil of bay is not employed in medicine, but is used in the preparation of bay rum. The latter is used as a wash for the hair and as an astringent application to the face after shaving.

Preparation

Spiritus Myrciæ Compositus, B.P.C.—(Sp. Myrc. Co.)—Compound Spirit of Bay. *Syn.*—Spiritus Pimentæ Compositus; Compound Spirit of Pimento. Oil of bay, oil of orange, oil of pimento, and dry extract of quassia, in alcohol (90 per cent.) and distilled water. Preparations similar in composition are sold as bay rum.

OLEUM MYRISTICÆ

(Ol. Myrist.)

Oil of Nutmeg

Oil of nutmeg is obtained by distillation from nutmegs. It occurs as a colourless or pale yellow liquid, with a characteristic odour and a warm, spicy taste. The oil **contains** *d*-camphene, which may be present to the extent of 80 per cent.; it also contains *d*-pinene, dipentene, *d*-borneol, *l*-terpineol, geraniol, safrole, myristicin (a methoxy derivative of safrole), and various esters. On distillation, about 60 per cent. of the oil passes over below 180°. Oil of nutmeg closely resembles volatile oil of mace and is scarcely distinguishable from it; frequently no commercial distinction is made between the two oils. Oil of nutmeg should be **stored** in well-closed containers in a cool place and protected from light.

Standard, B.P.—Oil of nutmeg has a specific gravity of 0·880 to 0·925. Optical rotation, +10° to +30°. Refractive index at 20°, 1·474 to 1·488. Residue on rapid evaporation in a flat dish on a water-bath, not more than 3 per cent. It is soluble in 3 volumes of alcohol (90 per cent.; specific gravity, 0·8334 to 0·8340).

Action and Uses.—Oil of nutmeg has carminative properties and is used as a flavouring agent. It is mildly counter-irritant and is sometimes used in liniments and hair lotions. After absorption, the oil has greater stimulant properties on the cerebral cortex than any other oil except oil of absinth; large doses may induce epileptiform convulsions. It is **administered** on sugar, or as Spiritus Myristicæ, and is added to purgative pills to prevent gripe.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

OLEUM MYRISTICÆ EXPRESSUM.—Expressed oil of nutmeg, Adeps Myristicæ, or mace butter, is a concrete oil of a bright orange colour obtained from nutmeg or mace by expression with heat. It acts as a mild stimulant when applied externally, and is sometimes added to plasters and hair lotions.

Preparation

Spiritus Myristicæ, B.P.C.—(Sp. Myrist.)—Spirit of Nutmeg. Oil of nutmeg, 1 in 10, in alcohol (90 per cent.). Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

This spirit was included in the British Pharmacopœia, 1914.

OLEUM MYRISTICÆ DETERPENATUM

(Ol. Myrist. Deterpenat.)

Terpeneless Oil of Nutmeg

Terpeneless oil of nutmeg is oil of nutmeg concentrated *in vacuo* until reduced to about one fifth of its volume. It consists of terpineol, linalol, borneol, geraniol, myristicin, myristic acid and traces of eugenol and safrole.

Standard.—Terpeneless oil of nutmeg is soluble in 3 volumes of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640). Specific gravity, 1·040 to 1·100. Optical rotation, +1° to +14°. Refractive index at 20°, 1·500 to 1·533.

Action and Uses.—Terpeneless oil of nutmeg has properties similar to those of oil of nutmeg. One fluid ounce of the terpeneless oil is equivalent in flavour to about five fluid ounces of the natural oil.

OLEUM NEROLI

(Ol. Nerol.)

Oil of Neroli

Synonyms—Oleum Aurantii Florum; Oil of Orange-flowers.

Oil of neroli is obtained by distillation with water from the fresh blossoms of the bitter-orange tree, *Citrus Aurantium* Linn. subsp. *amara* Engl., and is produced in Southern France. It occurs as a pale yellow liquid, slightly, but distinctly, fluorescent, becoming brownish-red on exposure to light, with an intense odour of orange blossoms, and having a bitter, aromatic taste. The alcoholic solution has a fine, violet-blue fluorescence. When exposed to low temperatures the oil becomes turbid and occasionally solid. Oil of neroli **contains** the methyl ester of anthranilic acid, which occurs in small quantity and to which the odour and fluorescence of the oil are due. Its odour in the undiluted state is disagreeable, but very pleasant in largely diluted solutions. Other constituents of the oil are nerol, *l*-linalol, $C_{10}H_{18}O$, linalyl acetate, $C_{12}H_{20}O_2$,

geraniol, $C_{10}H_{18}O$, limonene, $C_{10}H_{16}$, and a stearoptene, called neroli camphor, which is odourless and tasteless when pure, and melts at 55°. Oil of neroli should be **stored** in small, well-stoppered, amber-coloured bottles.

Standard.—Oil of neroli is soluble in twice its volume of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640), the solution becoming turbid on the addition of more of the alcohol. Specific gravity, 0·870 to 0·885. Optical rotation, 0° to +8°. Refractive index at 20°, 1·468 to 1·477. Saponification value, not more than 70.

Uses.—Oil of neroli is largely employed in perfumery. The aqueous distillate obtained in its preparation constitutes triple orange-flower water and the oil is used in the preparation of the concentrated water.

Preparations

Aqua Aurantii Floris, B.P.C.—(Aq. Aurant. Flor.)—Orange-flower water. Triple orange-flower water diluted, immediately before use, with twice its volume of distilled water.

This water was included in the British Pharmacopœia, 1914.

Aqua Aurantii Floris Concentrata, B.P.C.—(Aq. Aurant. Flor. Conc.)—Concentrated Orange-flower Water. Oil of neroli, about 1 in 170. One part added to 39 parts of distilled water yields a preparation which is approximately equivalent in strength to orange-flower water, but contains 1·5 per cent. v/v of alcohol (90 per cent.).

Aqua Aurantii Floris Triplex, B.P.C.—(Aq. Aurant. Flor. Trip.)—Triple Orange-flower Water. The undiluted orange-flower water of commerce.

Syrupus Aurantii Floris, B.P.C.—(Syr. Aurant. Flor.)—Syrup of Orange-flower. Triple orange-flower water, 15 per cent. v/v, with sucrose and syrup. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This syrup was included in the British Pharmacopœia, 1914.

OLEUM OLIVÆ
(Ol. Oliv.)

Olive Oil

Olive oil is obtained by expression from the ripe fruits of *Olea europæa* Linn., a small tree cultivated in Spain, France, Italy and other countries bordering on the Mediterranean, also in California and South Australia. It occurs as a pale yellow or greenish-yellow liquid, with a faint, peculiar, but not rancid, odour, and a bland taste. The green colour of some oil is due to chlorophyll. Exposed to the air the oil loses colour and becomes rancid, acquiring a disagreeable smell, a sharp taste and a thicker consistence, the changes being promoted by heat and accompanied by a large increase in the quantity of free fatty acid present in the oil. When heated to 120°, it becomes lighter in colour; at 220° it becomes nearly colourless and at the same time rancid, and at 315° it is decomposed. Other oils, such as cottonseed oil, arachis oil, tea-seed oil, and sesame oil, are common adulterants of olive oil. Oils of

high specific gravity usually exhibit a dark colour; if the specific gravity of a pale oil exceeds 0·918, it should be looked upon as possibly adulterated with sesame, cottonseed or poppyseed oils. Admixture with rape oil tends to lower the specific gravity and the saponification value. Since olive oil has a lower iodine value than most other oils that might be used as adulterants, this figure constitutes a most reliable means of detecting adulteration. Some genuine oils, particularly those of Tunisian and Algerian origin, give a reaction with the test for sesame oil given in the British Pharmacopœia, but on longer standing the colour of the acid layer changes from red to greenish-black. Olive oil is sometimes prepared by refining oil obtained by solvent extraction processes and such oil is often used for technical purposes.

Olive oil **contains** the glyceride of oleic acid, which constitutes about 90 per cent. of the portion remaining liquid when the oil is cooled to low temperatures; the remainder of the liquid portion consists largely of the glyceride of linolic acid. The part which congeals on cooling consists largely of the glyceride of palmitic acid and a very small proportion of the glyceride of arachidic acid. Phytosterol and free fatty acid are also usually present in small quantity in the oil, the proportion of free acid being considerable in the case of inferior, old or rancid oil.

Slightly **soluble** in alcohol (90 per cent.); miscible with ether, chloroform and light petroleum.

Standard, B.P.—Olive oil has a specific gravity of 0·915 to 0·918. Refractive index at 40°, 1·4605 to 1·4635. Acid value, not more than 2·0. Saponification value, 190 to 195. Iodine value, 79 to 88. It complies with tests for absence of cottonseed oil, of sesame oil, and of arachis oil. In making liniments, ointments, or plasters of the British Pharmacopœia, and of the British Pharmaceutical Codex, olive oil having an acid value not exceeding 6·0, but otherwise conforming to the above standard, may be used.

Action and Uses.—Olive oil is nutritious, demulcent and, owing to its lubricating action on the bowels, mildly laxative. As a laxative, 4 to 8 fluid ounces or more of olive oil is taken daily. It is administered in order to inhibit the secretion of gastric juice in the treatment of gastric and duodenal ulcers. Olive oil may be **administered** alone or in capsules, or in the form of emulsion. Large quantities of the oil (5 to 20 fluid ounces) are injected per rectum in constipation and to remove impacted fæces, and it is employed as a vehicle for the rectal administration of ether and paraldehyde. Olive oil may be **sterilised** by heating for one hour at 150°; it is used as a vehicle for the hypodermic administration of camphor, ether, etc. It is injected hypodermically as a nutrient in doses of 4 to 8 millilitres (1 to 2 fluid drachms). Externally, olive oil is emollient and soothing to inflamed surfaces; it may be applied freely to burns, alone or mixed with an equal quantity of lime water. It is applied to the skin to remove incrustations in eczema and psoriasis, and is used as a lubricant in massage. Olive oil is largely employed in pharmacy in the preparation of liniments, ointments and plasters. Arachis

oil or sesame oil may be used instead of olive oil in making liniments, plasters, ointments and soaps in India and in the African, Australasian, Eastern and Northern American divisions of the Empire.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Preparations

Emulsio Olei Olivæ, B.P.C.—(Emuls. Ol. Oliv.)—Emulsion of Olive Oil. It contains 50 per cent. v/v of olive oil. Dose.– 8 to 30 millilitres (¼ to 1 fluid ounce).

Extractum Malti cum Oleo Olivæ, B.P.C.—(Ext. Malt. c. Ol. Oliv.)—Extract of Malt with Olive Oil. Olive oil, approximately 15 per cent. v/v, with extract of malt. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Linimentum Calcii Hydroxidi, B.P.C.—(Lin. Calc. Hydrox.)—Liniment of Calcium Hydroxide. *Syn.*—Linimentum Calcis; Liniment of Lime. Solution of calcium hydroxide and olive oil, equal parts.

This liniment was included in the British Pharmacopœia, 1914, under the name of Linimentum Calcis.

Unguentum Aquosum, B.P.—(Ung. Aquos.)—Hydrous Ointment. Distilled water, about 25 per cent., and borax, 1 per cent., in white beeswax, white soft paraffin and olive oil.

OLEUM PALMÆ
(Ol. Palm.)
Palm Oil

Palm oil is a fat obtained from the fleshy portion of the ripe fruits of the palm tree, *Elæis guineensis* Jacq. which grows in immense numbers along the West Coast of Africa. The extraction is carried out by the natives, very crude methods being employed. The best qualities are obtained by allowing the fruits to ferment and then pressing or draining out the oil, while inferior qualities are prepared by boiling the pressed mass with water and skimming off the oil as it rises to the surface. Palm oil occurs as an orange-yellow to dark red fat, varying considerably in consistence and possessing a slightly sweetish taste and an odour resembling that of violets. The oil as imported always contains a large proportion of free fatty acids, sometimes as much as 50 per cent., or even more. Except in the case of the darker coloured varieties, it may be readily bleached, either by exposure to air, or by oxidising agents such as hydrogen peroxide, ozone, or potassium dichromate in acid solution, but it is not readily deodorised. It melts between 25° and 50°. The oil consists almost entirely of palmitin and olein, with small quantities of stearin and linolein. The colouring matter is carotene.

Soluble in light petroleum, ether and chloroform. The solubility in alcohol depends on the proportion of free fatty acid present.

Standard.—Palm oil has a refractive index at 40° of 1·451 to 1·459. Saponification value, 197 to 202. Iodine value, 49 to 57.

Uses.—Palm oil is used in large quantities in the manufacture of soap.

OLEUM PERSICÆ
(Ol. Persic.)
Persic Oil

Persic oil is the oil expressed from the seeds of *Prunus Persica* Stokes (peach kernel oil), or from the seeds of *Prunus Armeniaca* Linn. (apricot kernel oil). The oil closely resembles almond oil in its general characters. With the nitric acid test of the British Pharmacopœia, as described under Oleum Amygdalæ, peach kernel oil assumes a pale pink colour after standing for thirty minutes, while apricot kernel oil, under similar conditions, shows a deep pink. The oil does not solidify above −15°. It consists largely of the glycerides of oleic acid.

Soluble in light petroleum, ether and chloroform; slightly soluble in alcohol.

Standard.—Persic oil has a specific gravity of 0·917 to 0·921. Refractive index at 40°, 1·464 to 1·465. Acid value, not more than 8. Saponification value, 189 to 193. Iodine value, 100 to 110.

Uses.—Persic oil is used as a substitute for almond oil in the manufacture of toilet preparations. It may be sterilised by heating at 150° for one hour.

OLEUM PETROSELINI
(Ol. Petrosel.)
Oil of Parsley

Synonyms—Parsley Oil; Parsley Fruit Oil.

Oil of parsley is obtained by distillation from the fruit of parsley, *Carum Petroselinum* Benth. et Hook., cultivated in nearly all temperate climates. It occurs as a colourless or yellowish, thick liquid, having an odour different from that of the herb. The oil **contains** apiole, $C_{12}H_{14}O_4$, which separates in crystals on cooling the oil to a low temperature. The oil obtained from German fruit contains this body in considerable quantity, and is sometimes semi-solid at ordinary temperatures; that obtained from French fruit is not so rich in apiole. The terpene fraction of the oil boils at 160° to 164°, has a specific gravity of about 0·865 and a rotation of −30·8°; *l*-pinene is therefore probably a constituent of the oil.

Standard.—Oil of parsley is soluble in 8 times its volume of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640). Specific gravity, 1·040 to 1·100. Optical rotation, −5° to −11°. Refractive index at 20°, 1·510 to 1·519.

Action and Uses.—Oil of parsley has properties similar to those of apiol (see Apiol).

Dose.– 0·2 to 0·3 millilitre (3 to 5 minims).

OLEUM PICIS
(Ol. Pic.)
Oil of Tar

Oil of tar is obtained by the distillation of the dehydrated tar obtained by the destructive distillation of the woods of various species of *Pinus*. It consists of the whole of the volatile products of the tar freed from the pitch. It is a fairly mobile liquid, dark brownish-red in colour, with a characteristic, penetrating and rather unpleasant empyreumatic odour and a specific gravity greater than 1. Water shaken with it acquires a reddish-brown colour and an acid reaction, and on the addition of dilute ferric chloride solution a red colour is produced. On redistillation, oil of tar is separated into two fractions, the cut being made at the first appearance of an empyreumatic odour in the distillate. The first fraction, which varies in amount from different oils of tar, consists of a mobile, colourless or light yellow oil, tending to darken on keeping, with a specific gravity of about 0·87 and a refractive index of about 1·480. It is characterised by a pleasant, terpene-like odour and is known as "Light Oil of Tar" or **Spirit of Tar** and chiefly consists of hydrocarbons. Water shaken with it is almost neutral in reaction and, on the addition of dilute ferric chloride solution, no colour is produced. The second fraction consists of the whole of the remaining volatile products and, on redistillation, yields **Rectified Oil of Tar,** which is a light yellow oil, tending to darken on keeping, and possessing an empyreumatic odour similar to that of oil of tar. It consists of hydrocarbons and contains the whole of the phenols present in the original tar. Water shaken with it yields the same reactions as given above for oil of tar.

Action and Uses.—Oil of tar and spirit of tar are used for veterinary purposes. Rectified oil of tar is a powerful deodoriser, antiseptic and parasiticide. It is occasionally given internally as an anthelmintic and intestinal antiseptic and is also employed as an inhalation with hot water for chronic catarrhal affections. Externally, it is used as an antiseptic and stimulant in the treatment of eczema and similar skin diseases. Rectified oil of tar is best **administered** with glycerin and syrup, especially when given as a pulmonary antiseptic in phthisis and for coughs. Coster's Paste (Pigmentum Olei Picis cum Iodo) is used as an application for ringworm.

Dose.– 0·06 to 0·3 millilitre (1 to 5 minims).

Preparation

Pigmentum Olei Picis cum Iodo, B.P.C.—(Pig. Ol. Pic. c. Iod.)—Oil of Tar and Iodine Paint. *Syn.*—Pigmentum Picis cum Iodo; Pasta Iodi et Picis; Coster's Paste. Iodine, about 20 per cent. w/v, in rectified oil of tar.

OLEUM PIMENTÆ
(Ol. Piment.)
Oil of Pimento

Oil of pimento, or allspice oil, is obtained by distillation from the dried, full-grown, unripe fruit of *Pimenta officinalis* Lindl. It occurs as a yellow or yellowish-red liquid, becoming gradually darker on keeping, and having the characteristic odour of the fruit and a pungent, spicy taste. An alcoholic solution gives with very dilute solution of ferric chloride a fine indigo-blue colouration. On shaking the oil with an equal volume of strong solution of ammonia, it is converted into a semi-solid mass. The oil **contains** eugenol, $C_{10}H_{12}O_2$, and a sesquiterpene, the exact nature of which has not yet been ascertained. The clove-like odour of the oil is doubtless due to the eugenol, but the characteristic odour is due to some other substance or substances as yet unknown. A certain amount of resin is also present, but the oil has not been fully investigated.

Soluble in all proportions of alcohol (90 per cent.); soluble in alcohol (70 per cent.) (1 in 3), forming a clear solution.

Standard.—Oil of pimento, determined by the method of the British Pharmacopœia for eugenol in Oleum Caryophylli, contains not less than 60 per cent. v/v of eugenol. Specific gravity, 1·035 to 1·057. Optical rotation, 0° to −5°. Refractive index at 20°, 1·500 to 1·536.

Action and Uses.—Oil of pimento is used as a carminative and as an adjuvant to aperient medicines. It is **administered** on sugar or as pimento water.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

OLEUM PINI PUMILIONIS
(Ol. Pini Pumil.)
Oil of Pumilio Pine

Oil of pumilio pine is obtained by distillation from the fresh leaves of *Pinus Pumilio* Hænke, growing chiefly in the Austrian Alps, more especially in the Tyrol. It occurs as a colourless or faintly yellowish liquid, having a pleasant, aromatic odour and a pungent taste. The oil formerly known as Oleum Pini Sylvestris is not now distilled from the fresh leaves of *Pinus sylvestris* Linn.; the oil sold under this name is the distillate from the leaves and twigs of various conifers, collected indiscriminately. Oil of pumilio pine **contains** *l*-pinene, *l*-phellandrene, sylvestrene, dipentene, cadinene, and up to 10 per cent. of bornyl acetate.

Soluble in alcohol (1 in 8).

Standard.—Oil of pumilio pine, determined by the method of the British Pharmacopœia for esters in volatile oils, contains not less than 4 per cent. w/w of esters, calculated as bornyl acetate, $C_{12}H_{20}O_2$. Specific

gravity, 0·865 to 0·873. Optical rotation, −6° to −15°. Refractive index at 20°, 1·470 to 1·480.

Action and Uses.—Oil of pumilio pine is an antiseptic and expectorant in chronic laryngitis and bronchitis, but is employed principally as an inhalation with hot water (Vapor Olei Pini, 1 part of oil in 40 parts of water diffused with light magnesium carbonate, 1 in 80), or in a spray with light liquid paraffin, for its stimulating and antiseptic action in catarrh of the respiratory passages. Externally, the oil is rubefacient and mildly counter-irritant and is used to rub over chronic rheumatic joints which are then covered with cotton-wool, or 1 fluid drachm may be added to a warm bath. The oil is **administered** on sugar, in capsules, in glycerin and syrup, or in the form of pastilles.

Dose.– 0·06 to 0·3 millilitre (1 to 5 minims).

Preparations

Elixir Diamorphinæ et Pini Compositum, B.P.C.—(Elix. Diamorph. et Pini Co.)—Compound Elixir of Diamorphine and Pine. Each fluid drachm contains approximately $\frac{1}{16}$ grain of diamorphine hydrochloride and $\frac{5}{128}$ grain of terpin hydrate with oil of pumilio pine, alcohol (90 per cent.), compound solution of tartrazine, glycerin and sucrose. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Pastilli Diamorphinæ et Pini Compositus, B.P.C.—(Pastill. Diamorph. et Pini Co.)—Compound Diamorphine and Pine Pastilles. Each pastille contains $\frac{1}{128}$ grain of diamorphine hydrochloride, $\frac{1}{4}$ minim of oil of pumilio pine and $\frac{1}{8}$ grain of terpin hydrate.

Syrupus Pini, B.P.C.—(Syr. Pini)—Syrup of Pine. Oil of pumilio pine, 1 in 160, with alcohol (90 per cent.), compound solution of tartrazine, glycerin, sucrose and distilled water. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

OLEUM PULEGII

(Ol. Puleg.)

Oil of Pulegium

Synonym—Oil of Pennyroyal.

Oil of pulegium is obtained by distillation from fresh pennyroyal herb, *Mentha Pulegium* Linn. It occurs as a yellow or greenish yellow liquid, having a strong, aromatic, mint-like odour and an aromatic taste. The chief constituent of the oil is the ketone, pulegone, $C_{10}H_{16}O$, which is a colourless liquid, gradually becoming pale yellow and having a peppermint-like odour; its specific gravity is about 0·936; boiling-point, 221°; optical rotation, +22·9°; refractive index, 1·481 to 1·4865.

Standard.—Oil of pulegium contains not less than 85 per cent. v/v of pulegone. Specific gravity, 0·930 to 0·960. Optical rotation, +14° to +28°. Refractive index at 20°, 1·475 to 1·490. It is soluble in 3 times its volume of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901).

Assay.—Introduce 5 millilitres of the oil into an absorption flask with a graduated neck, as used for phenol determinations. Add 75

millilitres of 40 per cent. w/v sodium sulphite solution and sufficient solution of phenolphthalein to give a well-marked pink colouration. Shake vigorously, and neutralise with acetic acid diluted with twice its volume of distilled water, added in successive portions as the reaction proceeds. Heat on a water-bath, adding acetic acid as required to neutralise the liberated alkali, and shaking frequently during at least four hours. When the reaction is complete, fill up the flask with sodium sulphite solution, allow to stand overnight and measure the unabsorbed oil which has separated. Deduct the volume of unabsorbed oil from 5 millilitres and multiply by 20.

Action and Uses.—Oil of pulegium is employed chiefly as an emmenagogue. During excretion it mildly irritates the kidneys and bladder and reflexly excites uterine contractions. The oil is **administered** on sugar, or with a draught of water.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

Preparation

Spiritus Pulegii, B.P.C.—(Sp. Puleg.)—Spirit of Pulegium. *Syn.*—Essence of Pennyroyal; Essentia Pulegii; Essence of Pulegium. Oil of pulegium, 1 in 10, in alcohol (90 per cent.). Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

OLEUM RAPÆ
(Ol. Rap.)

Rape Oil

Synonym—Colza Oil.

Rape oil is the refined oil expressed from the seeds of *Brassica campestris* Linn. and certain other species of *Brassica*, which are extensively cultivated in Europe and Eastern India. The seeds contain approximately 40 per cent. of oil. Rape oil is a pale yellow, somewhat viscous oil, with a characteristic odour and, except in the most highly refined varieties, an unpleasant taste. Ravison oil is prepared from the seeds of a wild variety of *B. campestris* from the Black Sea district. It closely resembles rape oil, but usually has a higher iodine value and specific gravity, and contains more unsaponifiable matter. Rape oil and the other oils of the same group are distinguished from other vegetable oils by their higher viscosity, low saponification value and the large proportion of glycerides of erucic acid which they contain.

Standard.—Rape oil has a specific gravity of 0·913 to 0·917. Refractive index at 40°, 1·463 to 1·467. Acid value, not more than 5. Saponification value, 171 to 177. Iodine value, 97 to 105. Unsaponifiable matter, 0·6 to 1·2 per cent.

Action and Uses.—Rape oil is seldom given internally; it is, however, used in India as an edible oil. Externally, it is sometimes employed in place of olive oil. Rape oil is largely used as a lubricant and for burning.

OLEUM RICINI
(Ol. Ricin.)
Castor Oil

Castor oil is a fixed oil obtained by expression from castor oil seed. The expression is largely carried out in Italy, Marseilles, London and Hull, and the oil thus obtained is usually bleached by exposure to the sun or by chemical means. It occurs as a nearly colourless or pale yellow, viscid liquid, having a faint odour and a taste which is bland at first, but afterwards acrid and nauseating. When 1 millilitre of the oil is shaken with 0·5 millilitre of light petroleum (boiling-point, 50° to 60°), a clear solution is produced which becomes cloudy on the addition of a further 1·5 millilitres of the light petroleum. It forms a clear solution with an equal volume of dehydrated alcohol. On cooling the oil to 0° it remains bright, but on cooling to about −18° it congeals to a yellowish mass. The most distinctive features of the oil are its high specific gravity, the behaviour with dehydrated alcohol and with light petroleum, its high acetyl value and its high viscosity. The specific gravity is the highest of any natural fatty oil. Castor oil **contains** the glycerides of ricinoleic and *iso*ricinoleic acids; the glycerides of stearic and dihydroxystearic acid are also present in small quantities. Ricinoleic acid, $C_{18}H_{33}O_3$, is a viscid liquid and yields when acted upon by nitrous acid a crystalline body, ricinelaidic acid; a similar reaction occurs when castor oil is treated with nitrous acid.

Soluble in alcohol (90 per cent.) (1 in 3·5); miscible with dehydrated alcohol, ether and glacial acetic acid.

Standard, B.P.—Castor oil has a specific gravity of 0·958 to 0·969 Refractive index at 40°, 1·4695 to 1·4730. Acid value, not more than 4·0. Saponification value, 177 to 187. Iodine value, 82 to 90. Optical rotation, not less than +3·5°. It remains bright when maintained at 0° for three hours.

Action and Uses.—Castor oil is a mild purgative, its action being exerted as a result of saponification in the small intestine with formation of alkali ricinoleate. The oil is a valuable laxative and is particularly useful in acute diarrhœa, especially when due to any form of food poisoning; sometimes 0·6 millilitre (10 minims) of tincture of opium is added. Small repeated doses of 0·3 to 0·6 millilitre (5 to 10 minims) may be given in the intestinal colic of children. The oil is used as a rectal injection to remove impacted fæces, sometimes with olive oil. Externally, castor oil is sometimes applied, generally mixed with other emollients, for bed sores. The oil is often used as an ingredient of spirituous hair lotions. It is a soothing application when dropped into the eye after removal of foreign bodies, and is an excellent solvent for alkaloids, such as cocaine and atropine, when used in ophthalmic surgery. Castor oil is best **administered** in milk or lemon juice, in capsules, or as Mistura Olei Ricini. The dose should be administered an hour before breakfast, on an empty stomach. Oleum Ricini Aromaticum is

an agreeable form for administration to children. Castor oil may be sterilised by heating at 150° for one hour.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

MAGNESII RICINOLEAS.—Magnesium ricinoleate occurs as a white powder insoluble in water. It is used as a solid form of castor oil for the preparation of powders or pills. Dose.– 4 to 16 grammes (1 to 4 drachms).

SODII RICINOLEAS.—Sodium ricinoleate is the sodium salt of ricinoleic acid. Aqueous solutions have a low surface tension and have the power of detoxicating bacterial toxins. It has been used as an antiseptic in dentistry, either in solution or mixed with soft paraffin. It has also been administered internally in enteric-coated capsules in the treatment of anaphylactic reactions.

Preparations

Emulsio Olei Ricini Aromatici, B.P.C.—(Emuls. Ol. Ricin. Aromat.)—Emulsion of Aromatic Castor Oil. It contains 30 per cent. v/v of aromatic castor oil. Dose.– 30 to 60 millilitres (1 to 2 fluid ounces).

Mistura Olei Ricini, B.P.C.—(Mist. Ol. Ricin.)—Castor Oil Mixture. Each fluid ounce contains 3 fluid drachms of castor oil emulsified with acacia in triple orange-flower water and cinnamon water. Dose (as a single draught).– 30 to 60 millilitres (1 to 2 fluid ounces).

This mixture was included in the British Pharmacopœia, 1914.

Oleum Ricini Aromaticum, B.P.C.—(Ol. Ricin. Aromat.)—Aromatic Castor Oil. Castor oil, flavoured with saccharin, vanillin, chloroform and oils of cinnamon, clove and pimento. Dose.– 4 to 30 millilitres (1 to 8 fluid drachms).

Unguentum Zinci et Olei Ricini, B.P.C.—(Ung. Zinc. et Ol. Ricin.)—Zinc and Castor Oil Ointment. Zinc oxide and castor oil in benzoinated lard. It is of the same composition as a mixture of equal weights of castor oil and the zinc ointment of the British Pharmacopœia, 1914.

Unguentum Zinci et Olei Ricini cum Benzoino, B.P.C.—(Ung. Zinc. et Ol. Ricin. c. Benzoin.)—Zinc and Castor Oil Ointment with Benzoin. Zinc oxide, castor oil and compound tincture of benzoin with benzoinated lard. The proportions of zinc oxide and benzoinated lard are equivalent to about 40 per cent. of the zinc ointment of the British Pharmacopœia, 1914.

OLEUM ROSÆ
(Ol. Ros.)
Oil of Rose

Synonym—Otto of Rose.

Oil of rose is obtained by distillation from the fresh flowers of the damask rose, *Rosa damascena* Linn., a plant which is cultivated largely in Bulgaria. It occurs as a pale yellow, semi-solid, crystalline mass at ordinary temperatures, having the strong, fragrant odour of the damask rose and a mild, slightly sweet taste. It yields turbid mixtures with even very large amounts of alcohol on account of the sparingly soluble paraffins; the liquid portion of the oil forms clear solutions with alcohol (70 per cent.). French oil of rose is distilled from the flowers of *Rosa centifolia* and other species, the product differing in odour and characters

from the Bulgarian oil. The chief adulterants of oil of rose are geraniol, citronellol and phenylethyl alcohol, all of which lower the melting-point and raise the specific gravity. Paraffin wax, spermaceti and alcohol are sometimes added to compensate for the above additions, and to raise the melting-point. An examination of the stearoptene is, therefore, necessary, after separation by means of alcohol or acetone. The great similarity of oil of rose to many of its adulterants renders detection by physical properties a matter of the greatest difficulty; the sense of smell is one of the most useful means of assessing the value of the oil. Oil of rose **contains** the alcohols, geraniol, $C_{10}H_{18}O$, and citronellol, $C_{10}H_{20}O$, the two together being present to the extent of from 70 to 75 per cent., while the citronellol constitutes about one-third to one-half of the liquid portion of the oil. Traces of esters of these alcohols are also present, but as the characteristic odour of the oil is not due to any of these constituents, either singly or mixed, the presence of some other odorous principle is assumed. The differences in the odour of varieties of the oil appear to indicate chemical differences. Free acids, from decomposition of the esters, are also present. The solid stearoptene is a mixture of two or more odourless paraffin hydrocarbons, melting at 33° to 37°.

Standard.—Oil of rose, when tested by the method of the British Pharmacopœia for Oleum Anisi, congeals at 18° to 22° and melts between 19° and 23°. Specific gravity (30°/15·5°), 0·852 to 0·862. Optical rotation, −2° to −4°. Refractive index at 25°, 1·458 to 1·465.

Uses.—Oil of rose is largely employed in perfumery. It is also used in lozenges, dentifrices, ointments and toilet preparations.

Preparations

Aqua Mellis, B.P.C.—(Aq. Mel.)—Honey Water. Oils of bergamot, lavender, clove and sandal wood, musk and saffron, with triple rose water, triple orange-flower water, honey and alcohol (90 per cent.).

Aqua Rosæ, B.P.C.—(Aq. Ros.)—Rose Water. Triple rose water diluted, immediately before use, with twice its volume of distilled water.

This water was included in the British Pharmacopœia, 1914.

Aqua Rosæ Concentrata, B.P.C.—(Aq. Ros. Conc.)—Concentrated Rose Water. Oil of rose, 1 in 100. One part added to 39 parts of distilled water yields a preparation which is approximately equivalent in strength to rose water, but contains 1·25 per cent. of alcohol (90 per cent.).

Aqua Rosæ Triplex, B.P.C.—(Aq. Ros. Trip.)—Triple Rose Water. The undiluted rose water of commerce.

Liquor Rosæ Dulcis, B.P.C.—(Liq. Ros. Dulc.)—Sweet Solution of Rose. Cochineal, 1 in 25, with oil of rose, potassium carbonate, potassium acid tartrate, potash alum, glycerin, alcohol (90 per cent.) and distilled water.

Unguentum Aquæ Rosæ, B.P.C.—(Ung. Aq. Ros.)—Rose Water Ointment. It contains rose water, white beeswax, borax, almond oil and oil of rose.

This ointment was included in the British Pharmacopœia, 1914.

Unguentum Rosæ Album, B.P.C.—(Ung. Ros. Alb.)—White Rose Ointment. *Syn.*—Ceratum Galeni. Triple rose water, 25 per cent., with white beeswax, spermaceti, oil of rose and almond oil.

OLEUM ROSMARINI
(Ol. Rosmarin.)
Oil of Rosemary

Oil of rosemary is obtained by distillation from the flowering tops of rosemary, *Rosmarinus officinalis* Linn., an evergreen shrub indigenous to Southern Europe and growing abundantly on dry, rocky hills in the Mediterranean regions. Most of the oil is imported from the South of France and the Dalmatian Islands, but that distilled in Britain is superior to the imported oil. It occurs as a colourless or pale yellow liquid, with a characteristic, pungent odour and a warm, bitter, camphoraceous taste. The chief adulterant is oil of camphor, which may be detected by the limit test for cineole. Oil of rosemary **contains** borneol, from 8 to 16 per cent., bornyl acetate and other esters, about 2 to 5 per cent., together with camphor, cineole, pinene and camphene. It should be **stored** in well-closed containers in a cool place and protected from light.

Standard, B.P.—Oil of rosemary contains not less than 2 per cent. w/w of esters, calculated as bornyl acetate, $C_{12}H_{20}O_2$, and not less than 9 per cent. w/w of free alcohols, calculated as borneol, $C_{10}H_{18}O$. Specific gravity, 0·900 to 0·919. Optical rotation, −5° to +10°. Refractive index at 20°, 1·464 to 1·476. It is soluble in an equal volume of alcohol (90 per cent.; specific gravity, 0·8334 to 0·8340), and in 10 volumes of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640). It complies also with a limit test for cineole.

Action and Uses.—Oil of rosemary has carminative properties. It is employed principally as Spiritus Rosmarini in hair lotions for its odour and for its supposed effect in stimulating the growth of the hair.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

Preparation

Spiritus Rosmarini, B.P.C.—(Sp. Rosmarin.)—Spirit of Rosemary. Oil of rosemary, 1 in 10, in alcohol (90 per cent.). Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

This spirit was included in the British Pharmacopœia, 1914.

OLEUM RUSCI
(Ol. Rusc.)
Birch Tar Oil

Synonyms—Oleum Betulæ Albæ; Oil of White Birch; Oleum Betulæ Pyroligneum.

Birch tar oil is prepared by the destructive distillation of the wood and bark of *Betula alba* Linn. The tar obtained is allowed to stand and separate into two layers, a tar, and an oil which constitutes birch tar oil.

It occurs as a thick liquid, brownish-black in colour and having a peculiar, agreeable, penetrating odour. The oil does not harden on exposure to the air. Russian leather owes its characteristic odour to the use of the oil in its preparation. A few drops of birch tar oil shaken with water and filtered, gives a solution which produces a pink colouration with potassium cyanide solution, intensified on the addition of ammonia. The aqueous solution, obtained by shaking 1 part with 10 parts of water, is almost colourless and has an acid reaction. With this solution a trace of ferric chloride produces a green colour. Birch tar oil contains, amongst other constituents, guaiacol, cresols and catechol. A rectified birch tar oil is obtained from the crude tar by steam distillation, having a specific gravity between 0·920 and 0·945; it is a light brown oil, differing in odour and composition from Oleum Rusci.

Soluble in oils, fats and chloroform; partially soluble in alcohol.

Standard.—Birch tar oil has a specific gravity of 0·920 to 0·955. Unsaponifiable matter, not less than 70 per cent. 5 millilitres of the aqueous solution, with 2 or 3 drops of aniline and about 5 drops of hydrochloric acid, produces a yellowish-brown but not a red colouration. A solution in light petroleum (1 in 20), on being shaken with a weak solution (about 1 in 1000) of copper acetate, does not assume a greenish colour (absence of fir tar).

Action and Uses.—Birch tar oil resembles oil of cade in its properties and is used for external application in the form of ointment (10 per cent.) or soap (10 per cent.) for eczema, psoriasis, and other skin affections. Mixed with essential oils it is used as a mosquito repellant.

OLEUM FAGI PYROLIGNEUM.—Oil of beech tar is used mixed with plaster of paris as a deodorant dusting powder in cases of gangrene and for bed sores.

Preparation

Unguentum Rusci Compositum, B.P.C.—(Ung. Rusc. Co.)—Compound Birch Tar Ointment. Birch tar oil, 8 per cent., with resorcinol, zinc oxide and starch, in hydrous wool fat and white soft paraffin.

OLEUM RUTÆ
(Ol. Rut.)

Oil of Rue

Oil of rue is obtained by distillation from rue, *Ruta graveolens* Linn., a plant cultivated in countries of temperate climate. It occurs as a pale yellow liquid, having a characteristic, sharp, unpleasant odour, becoming pleasant on considerable dilution. Oil of rue **contains** about 90 per cent. of methylnonylketone, $C_{11}H_{22}O$, and traces of methyl methylanthranilate. The value of the oil depends on the amount of methylnonylketone contained in it, and the solidifying point affords

some indication of the amount of ketone present. Algerian oil of rue, from *R. montana*, contains methylheptylketone which is liquid at 0°; this oil cannot replace the oil distilled from *R. graveolens*.

Standard.—Oil of rue, determined by the method of the British Pharmacopœia for Oleum Anisi, has a freezing-point of 8° to 10° and a melting-point of 9° to 11°. Specific gravity, 0·832 to 0·845. Optical rotation, 0° to +3°. Refractive index at 20°, 1·430 to 1·440. It is soluble in three volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901), showing a blue fluorescence on further dilution.

Action and Uses.—Oil of rue has been employed as an antispasmodic in hysterical conditions and as an emmenagogue in amenorrhœa. It may be **administered** on sugar or in hot water. The oil is sometimes given as an enema, alone or with mucilage of starch or extract of ox bile, in post-operative intestinal stasis.

Dose.– 0·12 to 0·3 millilitre (2 to 5 minims).

OLEUM SABINÆ
(Ol. Sabin.)
Oil of Savin

Oil of savin is obtained from the fresh tops of *Juniperus Sabina* Linn. It occurs as a colourless or yellowish liquid, having a peculiar odour and a bitter, pungent camphoraceous taste. French oil of savin, derived from *Juniperus phœnicea* Linn., contains over 75 per cent. of pinene and only about 10 per cent. of sabinyl acetate. It has a lower specific gravity (about 0·890) and a lower optical rotation (+4° to +5°) than true oil of savin. The chief constituent of the oil is sabinol, $C_{10}H_{16}O$, occurring partly in the free state and partly combined as sabinyl acetate (about 35 to 55 per cent.). The sesquiterpene cadinene, $C_{15}H_{24}$, is present, and also some pinene.

Standard.—Oil of savin is soluble in from 1 to 2 volumes of alcohol (90 per cent.; specific gravity, 0·8334 to 0·8340). Specific gravity, 0·905 to 0·930. Optical rotation, +43° +66°. Refractive index at 20°, 1·470 to 1·478. Acid value, 0·5 to 3·6. Saponification value, 101 to 169.

Action and Uses.—Oil of savin is a powerful irritant, both externally and internally. It is employed in amenorrhœa with other emmenagogues, but in addition to pelvic congestion it may cause hæmaturia and violent gastro-intestinal irritation, and its use, therefore, requires caution. It is usually **administered** in pills, the oil being massed with powdered liquorice and soap. In cases of **poisoning** by oil of savin, an emetic should be administered and castor oil given, with morphine hypodermically.

Dose.– 0·06 to 0·24 millilitre (1 to 4 minims).

OLEUM SANTALI

(Ol. Santal.)

Oil of Sandal Wood

Synonym—Oil of Santal Wood.

Oil of sandal wood is obtained by distillation from the heartwood of *Santalum album* Linn., a small tree indigenous to the mountains of India and cultivated in dry, open places in Southern India, chiefly in Mysore, Malabar and Coimbatore. It occurs as a pale yellow or nearly colourless, viscid liquid, with a peculiar, faint but persistent odour and an unpleasant, nauseous taste. Australian oil, other varieties of sandal wood oil and cedar wood oil have occurred as adulterants of the oil. Cedar wood oil increases the optical rotation, lowers the specific gravity and diminishes the solubility. West Indian sandal wood oil (so-called) is dextrorotatory and with difficulty soluble in alcohol (90 per cent.). Oil of sandal wood **contains** santalol, a mixture of two isomeric sesquiterpene alcohols of the formula $C_{15}H_{24}O$, which is present to the extent of over 90 per cent., and esters of santalol. The oil also contains an aldehyde, santalal, $C_{15}H_{22}O$, which yields santalenic acid on oxidation (melting-point, 76°). Oil of sandal wood should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in alcohol (90 per cent.) (more than 1 in 1). The solubility diminishes under the action of air and light.

Standard, B.P.—Oil of sandal wood contains not less than 2 per cent. w/w of esters, calculated as santalyl acetate, $C_{17}H_{26}O_2$, and not less than 90 per cent. w/w of free alcohols, calculated as santalol, $C_{15}H_{24}O$. Specific gravity, 0·973 to 0·985. Optical rotation, −15° to −20°. Refractive index at 20°, 1·500 to 1·510. It is soluble at 20° in 5 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901).

Action and Uses.—Oil of sandal wood is sometimes given in the sub-acute stages of cystitis and gonorrhœa for its action on the urinary passages during excretion; it is said to be of use in diminishing the frequency of micturition which is so marked in tuberculosis of the bladder. On account of its persistent taste, the oil is usually **administered** in capsules, often in combination with other volatile oils, or it may be given as an emulsion. Various compound solutions of oil of sandal wood with copaiba, cubeb, buchu, etc. are also prepared.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Preparations

Liquor Copaibæ, Buchu et Cubebæ cum Oleo Santali, B.P.C.—(Liq. Copaib. Buchu et Cubeb. c. Ol. Santal.)—Solution of Copaiba, Buchu and Cubeb with Sandal Wood Oil. Oil of sandal wood, 1 in 10, and oil of cassia, 1 in 20, with solution of copaiba, buchu and cubeb, and alcohol (90 per cent.). Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Liquor Copaibæ et Olei Santali, B.P.C.—(Liq. Copaib. et Ol. Santal.)—Solution of Copaiba and Sandal Wood Oil. Solution of copaiba, 4 in 5, with oils of sandal wood and cassia, and alcohol (90 per cent.). Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Liquor Santali Compositus, B.P.C.—(Liq. Santal. Co.)—Compound Solution of Sandal Wood Oil. Oil of sandal wood, 1 in 20, with oil of cinnamon, tincture of buchu, tincture of cubeb and alcohol (90 per cent.). Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

OLEUM SANTALI AUSTRALIENSIS

(Ol. Santal. Austral.)

Oil of Australian Sandal Wood

Oil of Australian sandal wood is obtained, by distillation and rectification, from the wood of *Eucarya spicata* Sprague and Summerhayes (*syn.– Santalum spicatum*), a large bush found in West Australia. It occurs as a colourless or pale yellow, oily liquid, with a characteristic odour and an unpleasant taste. Oil of Australian sandal wood **contains** alcohols which are isomeric with the santalols. It should be **stored** in well-closed containers in a cool place and protected from light.

Standard, B.P.—Oil of Australian sandal wood contains not less than 90 per cent. w/w of free alcohols, calculated as $C_{15}H_{24}O$. Specific gravity, 0·970 to 0·976. Optical rotation, —3° to —10°. Refractive index at 20°, 1·498 to 1·508. It is soluble at 20° in 3 to 6 volumes of alcohol (70 per cent.; specific gravity, 0·8896 to 0·8901).

Action and Uses.—Oil of Australian sandal wood has properties similar to those of sandal wood oil and is used for the same purposes. Oils of sandal wood are also used in perfumery.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

OLEUM SASSAFRAS

(Ol. Sassaf.)

Oil of Sassafras

Oil of sassafras is obtained by distillation from the root or the root bark of species of *Sassafras* T. Nees and Eberm. It occurs as a pale yellow or reddish-yellow liquid, having the characteristic odour of safrole and a warm, aromatic taste. The chief **constituent** of the oil is safrole, $C_{10}H_{10}O_2$, which is present to the extent of about 80 per cent. and is the body to which the oil owes its odour and chief properties. Most of the safrole may be separated from the oil by freezing. Artificial sassafras oil consists of fractions of camphor oil of a specific gravity approaching that of the genuine oil.

Standard.—Oil of sassafras is soluble in 3 volumes of alcohol (90 per cent.; specific gravity, 0·8334 to 0·8340), the solution being neutral to litmus. Specific gravity, 1·070 to 1·084. Refractive index at 20°, 1·523 to 1·531. Optical rotation, +1° to +5°.

Action and Uses.—Oil of sassafras has rubefacient properties. It is seldom given internally; in large doses, the oil, like the oils of pulegium, thyme and rosemary, causes fatty changes in the liver. Externally, oil of sassafras is sometimes employed as an anodyne liniment in chronic rheumatism in the same manner as oil of camphor. It is used to destroy pediculi, but its use is not unattended with danger; the oil should be applied to the hair with a stiff brush, leaving the skin untouched.

Dose.– 0·06 to 0·3 millilitre (1 to 5 minims).

OLEUM SESAMI
(Ol. Sesam.)
Sesame Oil

Synonyms—Gingelly Oil; Teel Oil.

Sesame oil is the fixed oil obtained by expression from the seeds of *Sesamum indicum* Linn., a plant largely grown in India, China, Japan and other tropical countries. It occurs as a pale yellow, limpid liquid, with a slight, pleasant, grain-like odour and a bland taste. It does not solidify when cooled to 0°. Sesame oil may be identified, and its presence in other oils detected, by the following test, known as Baudouin's test.—Shake the oil with half its volume of a 1 per cent. w/v solution of sucrose in hydrochloric acid, and allow the mixture to stand for five minutes; the acid layer acquires a deep pink colour. The sugar may be replaced by one or two drops of a 2 per cent. w/v alcoholic solution of furfural. By the addition of a suitable colouring agent, a substituted oil could be prepared so as to give a pink colour on the addition of hydrochloric acid; the test should therefore be repeated on the sample without the addition of sucrose or furfural, when no colouration should be produced. The chromogenic substance passes completely into the fatty acids when these are separated, and is not destroyed by heating the oil to between 200° and 250° for twenty minutes. The common adulterants are arachis oil, cottonseed oil and rape oil. Sesame oil **contains** glycerides of oleic and linoleic acids, with small proportions of the glycerides of stearic, palmitic and myristic acids. Sesamin, $C_{18}H_{18}O_5$, another constituent of the oil, may be obtained in long, crystalline needles melting at 118°.

Slightly **soluble** in alcohol (90 per cent.); miscible with ether, chloroform and light petroleum.

Standard, B.P.—Sesame oil has a specific gravity of 0·921 to 0·924. Refractive index at 40°, 1·4650 to 1·4665. Acid value, not more than 4·0. Saponification value, 188 to 193. Iodine value, 103 to 112. It complies also with tests for the absence of cottonseed oil and of arachis oil.

Action and Uses.—Sesame oil has properties similar to those of olive oil, and may be used instead of olive oil in the preparation of

official liniments, plasters, ointments and soaps in India, and in the Eastern, African, Australasian and North American divisions of the Empire. It is used in the preparation of additive compounds of iodine and bromine, which are employed for external, internal or subcutaneous use, and as an opaque medium for the X-ray examination of a directly accessible cavity of the body. Sesame oil may be sterilised by heating at 150° for one hour. The best qualities of the oil are largely used in the manufacture of margarine.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

OLEUM SINAPIS EXPRESSUM

(Ol. Sinap. Express.)

Expressed Oil of Mustard

Synonym—Black Mustard Oil.

Expressed oil of mustard is obtained by pressure from the seed of *Brassica nigra* (Linn.) Koch. It is obtained as a by-product in the manufacture of the volatile oil, and occurs as a brownish-yellow or greenish-brown liquid, having a mild taste. It consists chiefly of the glyceride of oleic acid, and contains small amounts of glycerides of solid fatty acids, including arachidic. The oil does not solidify until the temperature falls to about −15°.

Slightly **soluble** in alcohol; miscible with ether, chloroform and light petroleum.

Standard.—Expressed oil of mustard has a specific gravity of 0·916 to 0·920. Refractive index at 40°, 1·4655 to 1·4670. Saponification value, 174 to 180. Iodine value, 115 to 126.

Action and Uses.—Expressed oil of mustard has mild rubefacient properties. It is employed as an application to the chest in place of camphorated oil, and as a liniment for rheumatic joints.

WHITE MUSTARD SEED OIL is obtained from the seed of *Brassica alba* Boiss., and occurs as a golden-yellow liquid, having a burning taste. Specific gravity, 0·912 to 0·917. Refractive index at 40°, 1·4650 to 1·4660. Saponification value, 171 to 178. Iodine value, 98 to 108. The oil obtained from white mustard seed is used for lubricating and also for burning.

OLEUM SINAPIS VOLATILE

(Ol. Sinap. Vol.)

Volatile Oil of Mustard

Volatile oil of mustard may be prepared synthetically, or obtained by distillation from the dried, ripe seeds of black mustard, *Brassica*

nigra (Linn.) Koch, after they have been deprived of fixed oil and macerated with tepid water (below 70°) for several hours, when a reaction takes place between the glycoside, sinigrin (potassium myronate), and the ferment, myrosin, with the production of mustard oil. The synthetic oil is obtained by the interaction of allyl iodide and potassium thiocyanate in alcoholic solution; allyl thiocyanate is first formed, and under the influence of heat is converted into allyl *iso*thiocyanate. Volatile oil of mustard occurs as a colourless or pale yellow, strongly refractive, mobile liquid, having an intensely pungent odour and an acrid taste. Great caution should be taken in smelling the oil. In contact with the skin it causes almost immediate blistering. Exposed to light it gradually becomes reddish-brown, and at the same time deposits a film on the inside of the bottle. The specific gravity serves to indicate the absence of chloroform, carbon disulphide, fatty oils, alcohol and petroleum. Allyl *iso*thiocyanate forms a solid, non-volatile compound with ammonia. On adding excess of ammonia and alcohol to volatile oil of mustard, the odour of both disappears gradually in the cold, but more quickly on heating, while crystals of thiosinamine are formed. Volatile oil of mustard **contains** allyl *iso*thiocyanate, C_3H_5NCS, to which the high specific gravity of the oil is due. It also contains small and variable amounts of allyl cyanide, carbon disulphide, and probably traces of isomeric allyl thiocyanate.

Soluble in water (1 in 50), in alcohol (70 per cent.) (1 in 10), in all proportions of alcohol, ether, amyl alcohol, benzene, light petroleum and carbon disulphide.

Standard.—Volatile oil of mustard contains not less than 92 per cent. w/w of C_3H_5NCS. Specific gravity, 1·014 to 1·025. Refractive index at 20°, 1·525 to 1·530. Optically inactive. 1 millilitre of the oil diluted with 5 millilitres of alcohol produces no blue or bluish-green colour on the addition of a drop of ferric chloride solution (absence of phenols).

Assay.—Dissolve about 4 grammes, accurately weighed, in sufficient alcohol to produce 100 millilitres. To 5 millilitres of this solution in a 100 millilitre flask add 50 millilitres of N/10 silver nitrate and 5 millilitres of strong solution of ammonia; heat under a reflux condenser on a boiling water-bath for thirty minutes; cool to 15·5°, dilute to 100 millilitres with water, and filter. To 50 millilitres of the filtrate add 4 millilitres of nitric acid, and titrate the excess of silver nitrate with N/10 ammonium thiocyanate, using ferric ammonium sulphate as indicator; each millilitre of N/10 silver nitrate is equivalent to 0·004955 gramme of C_3H_5NCS.

Action and Uses.—Volatile oil of mustard is an extremely powerful irritant, and when applied to the skin it produces vesication very rapidly. The very painful nature of blisters caused by mustard is explained by the volatility and consequently great penetrating power of the oil. Diluted with fifty times its volume of alcohol or Cologne spirit, or as Linimentum Sinapis, the oil is employed as a counter-irritant and rubefacient in

cases where blisters cannot readily be applied, especially to paint behind the ear in catarrh of the middle ear. It is also used in cases of pleurisy and pneumonia, and to relieve deep-seated pain.

Preparation

Linimentum Sinapis, B.P.C.—(Lin. Sinap.)—Liniment of Mustard. Volatile oil of mustard, about 1 in 30, with camphor and castor oil in alcohol (90 per cent.).

OLEUM SOJÆ
(Ol. Sojæ)
Soya Oil

Synonyms—Soja Bean Oil; Soy Bean Oil; Soya Bean Oil.

Soya oil is obtained by expression from the seeds of the soya plant, which is indigenous to China, Formosa, Indo-China, Japan, Korea and Manchuria. The yield of oil varies from 10 to 12 per cent. When heated to 260°, the oil becomes pale and remains so. It occurs as a pale-yellow to brownish-yellow oil, with a slight but characteristic taste and smell. The oil **contains** the glycerides of oleic and linolic acid with smaller proportions of the glycerides of palmitic, stearic and linolenic acids. In its general properties it is intermediate between linseed oil and cottonseed oil. It gives no characteristic colour reaction.

Slightly **soluble** in alcohol; miscible with ether, chloroform and light petroleum.

Standard.—Soya oil has a specific gravity of 0·924 to 0·927. Refractive index at 40°, 1·4675 to 1·4685. Acid value, not more than 5. Saponification value, 190 to 194. Iodine value, 130 to 137. Unsaponifiable matter, 0·7 to 1·5 per cent.

Action and Uses.—Soya oil is edible, and it may be used as a substitute for either linseed or cottonseed oil for soap-making purposes. It is also used as a lamp oil, and in varnishes, but for this purpose it is inferior to linseed oil. Like other vegetable oils, it does not contain the fat-soluble vitamins.

OLEUM SUCCINI
(Ol. Succin.)
Oil of Amber

Synonyms—Oleum Succini Rectificatum; Rectified Oil of Amber.

Oil of amber is obtained by the destructive distillation of resins, or as a distillate of resin oil. It was formerly obtained from amber by destructive distillation, and purified by redistillation. It occurs as a

transparent, pale yellow or brownish-yellow liquid, having a penetrating, disagreeable odour and a burning, acrid taste. It is a variable product; the specific gravity varies from 0·850 to 0·940.

Soluble in alcohol (90 per cent.), ether, chloroform and in fixed oils.

Action and Uses.—Oil of amber has properties resembling those of oil of turpentine, and is sometimes given internally in the treatment of asthma and whooping cough. It is best **administered** on sugar. Externally, mixed with olive oil or camphorated oil, or as Linimentum Succini Compositum, it is used to rub on rheumatic parts, and on the chest in cases of bronchitis and whooping cough.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

Preparation

Linimentum Succini Compositum, B.P.C.—(Lin. Succin. Co.)—Compound Liniment of Amber. Oil of amber and oil of clove, of each 1 in 4, in olive oil.

OLEUM TEREBINTHINÆ

(Ol. Terebinth.)

Oil of Turpentine

Synonyms—Oleum Terebinthinæ Rectificatum; Rectified Oil of Turpentine.

Oil of turpentine is the oil obtained by distillation and rectification from turpentine, an oleo-resin obtained from *Pinus palustris* Mill., *P. maritima* Lam. and other species of *Pinus* growing in America, France, Russia and elsewhere. The varieties of oil of turpentine usually found in commerce are the French and the American, most of the oil being imported from America. It occurs as a colourless, limpid liquid, with a strong, peculiar odour and a pungent, somewhat bitter taste, both becoming stronger and less pleasant on storage and on exposure to the air. The odour of the French oil is finer and milder than that of the American oil. The sharp odour is said to be due to an aldehyde formed by exposure of the oil to the air. French turpentine is always strongly lævorotatory, the American variety contains both lævo- and dextro-terpenes, and may be either lævo- or dextrorotatory. On exposure to the air the oil undergoes rapid change, especially in the presence of moisture. It becomes viscid and yellow, and acquires an acid reaction, the specific gravity increases, the boiling-point rises and, unlike most oils, the solubility in alcohol increases. These changes are all caused by slow oxidation. When treated with sulphuric acid oil of turpentine yields terebene, the pinene being converted into dipentene.

The common adulterants are petroleum, resin oil and wood turpentine. Petroleum may be detected by its lowering the specific gravity,

and also by the flash-point, which for pure oil of turpentine is from 33° to 34°. Resin oil, a product of the destructive distillation of colophony, may be detected by the fatty stain which the adulterated oil leaves when evaporated from paper. Wood turpentine, which is obtained by distilling the roots and stumps of various species of *Pinus*, has a lower iodine value and a higher specific gravity.

Oil of turpentine **contains** hydrocarbons, principally Δ-3-carene in the case of Indian, Russian and Scandinavian oils, and the isomeric bodies, *d*- and *l*-pinene, in American and French oils. Other constituents are resin acids, camphene and fenchene, while dipentene, the optically inactive form of limonene, and polymerised terpenes may occur as the result of the action on pinene of the acids present. Traces of oxidation products such as formic, acetic and camphoric acids, as well as camphoric aldehyde, $C_{10}H_{16}O_3$, are also present, the last-named giving the peculiar odour to old oil of turpentine. The action of direct sunlight in the presence of air and moisture causes the formation of pinol hydrate, $C_{10}H_{18}O_2$, while the continuous action of air and moisture develops a large quantity of oxygenated products, including hydrogen peroxide and camphoric acid. Oil of turpentine should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in alcohol (90 per cent.) (1 in 7); miscible with dehydrated alcohol, alcohol (95 per cent.), chloroform, ether, carbon disulphide and glacial acetic acid.

Standard, B.P.—Oil of turpentine has a specific gravity of 0·860 to 0·870. Refractive index at 20°, 1·467 to 1·477. Iodine value, determined by a specified method, not less than 340. Residue on rapid evaporation in a flat dish on a water-bath, not more than 0·5 per cent.

Action and Uses.—The action of oil of turpentine is representative of that of a large number of volatile oils. They are antiseptic, whether used internally or externally, and in sufficient concentration are rapidly germicidal to all forms of bacteria. Taken internally, the volatile oils excite a reflex flow of saliva, and cause a sensation of warmth in the mouth and stomach. They are carminative, relieve colic, and assist in the expulsion of flatus. They are absorbed unchanged into the blood, and produce leucocytosis, excretion taking place through the lungs, skin and kidneys. During excretion by the bronchioles they act as expectorants, assisting in the expulsion of mucus; excretion by the skin causes some diaphoresis and may give rise to mild skin eruptions, this being especially common with oil of copaiba. The most important action of many volatile oils is that exerted upon the genito-urinary tract after excretion by the kidneys. They produce dilatation of renal vessels and consequently diuresis, and appear in the urine in association with glycuronic acid. They lessen inflammatory exudation, and retard putrefaction of the urine. Large doses set up inflammation of the bladder and urethra, and small doses may exaggerate pre-existing inflammatory conditions; the oils are therefore given only in the sub-acute stages of disease. Applied to the skin the volatile oils produce

irritation and rubefaction, the redness being due to dilatation of the superficial vessels. Inhaled, they arrest profuse secretion and relieve congestion of the bronchioles, but the degree of concentration obtainable in this manner is insufficient for their antiseptic action to be exerted to any great extent.

Oil of turpentine is given in small doses in bronchitis and phthisis. Large doses are purgative and anthelmintic; to prevent absorption they are best given with castor oil. As an enema, with or without castor oil, it is used to expel tape-worms and thread-worms, and to evacuate the bowel and remove flatulent distension. It is given internally, and by enema with olive oil, in the tympanites of typhoid fever. Subcutaneous injection of oil of turpentine is employed to promote the formation of a "fixation abscess" in obscure infections, in order to assist in the isolation of the infecting organism. It should not be administered during pregnancy. Oil of turpentine is employed externally as a counter-irritant and rubefacient in the form of Linimentum Terebinthinæ or Linimentum Terebinthinæ Aceticum in the treatment of chronic rheumatism and various chest affections. To relieve deep-seated pain and inflammation, as in peritonitis, flannels are wrung out in hot water, sprinkled with oil of turpentine and applied to the seat of pain. The oil is used as an inhalation in chronic bronchitis, but terebene is usually preferred. It is used also to arrest minor hæmorrhage from the tooth socket or nose.

Oil of turpentine may be **administered** in mixture form, emulsified with half its weight of powdered acacia, or one-fourth its weight of powdered tragacanth; it is also given enclosed in gelatin capsules. It has been given as an antidote in cases of poisoning by phosphorus, but although it combines with the phosphorus to form compounds of a less toxic nature than that substance, the results have not been entirely satisfactory. In cases of **poisoning** by large doses of oil of turpentine, emetics and demulcent drinks should be given, with magnesium sulphate to promote purgation, and opium to relieve pain.

Dose.- 0·2 to 0·6 millilitre (3 to 10 minims); as an anthelmintic, 8 to 16 millilitres (2 to 4 fluid drachms).

Preparations

Linimentum Album, B.P.C.—(Lin. Alb.)—White Liniment. *Syn.*—Egg Liniment, White Embrocation; Linimentum Album Aceticum. An egg emulsion containing acetic acid, about 1 in 12, and oil of turpentine, about 1 in 2½.

Linimentum Terebinthinæ, B.P.—(Lin. Terebinth.)—Liniment of Turpentine. Oil of turpentine, 65 per cent., v/v, and camphor, 5 per cent. w/v, emulsified in water by means of soft soap.

Linimentum Terebinthinæ Aceticum, B.P.—(Lin. Terebinth. Acet.)—Acetic Liniment of Turpentine. *Syn.*—Liniment of Turpentine and Acetic Acid. Glacial acetic acid, 11 per cent. v/v, and liniment of camphor, 44·5 per cent. v/v, in oil of turpentine.

Terebinthina Veneta Factitia, B.P.C.—(Tereb. Venet. Fact.)—Factitious Venice Turpentine. A mixture of colophony, linseed oil and oil of turpentine.

OLEUM THEOBROMATIS
(Ol. Theobrom.)
Oil of Theobroma

Synonyms—Cocoa Butter; Cacao Butter.

Oil of theobroma is a solid fat obtained by expression from crushed and roasted theobroma seed and is obtained as a by-product in the manufacture of cocoa. It occurs as a yellowish-white or pale yellow solid, becoming white on keeping. It has a slight, agreeable odour resembling that of cocoa, and a bland taste. It is usually supplied in oblong cakes, brittle when cold, breaking with a smooth fracture which shows indications of crystalline structure, and becoming soft at 25°. The common adulterants are dika fat, illipe butter, paraffin, stearin, coconut stearin, wax, tallow or other fats. Oil of theobroma **contains** the glycerides of stearic (about 40 per cent.), palmitic and oleic acids, together with small quantities of the glycerides of arachidic, linoleic and other fatty acids.

Soluble in ether, chloroform, benzene, light petroleum and boiling dehydrated alcohol; slightly soluble in alcohol (90 per cent.).

Standard, B.P.—Oil of theobroma has a melting-point of 30° to 35°. Refractive index at 40°, 1·4565 to 1·4575. Acid value, not more than 4·0. Saponification value, 188 to 195. Iodine value, 35 to 40. It complies also with a test for the absence of wax, stearin and tallow.

Action and Uses.—Oil of theobroma is employed in pharmacy chiefly for the preparation of suppositories, pessaries and bougies. It is customary to prepare suppositories, etc., with an oil of theobroma basis, in the absence of any indication to the contrary. In hot climates, and for ingredients which lower the melting-point of the oil, it is sometimes advisable to add a small proportion of wax to the mass. Oil of theobroma is sometimes an ingredient of emollient ointments. An emulsion and ethereal solution of theobroma have been used as lubricants in the preparation of compressed tablets. The oil is also used as a lubricant in massage.

OLEUM THYMI
(Ol. Thym.)
Oil of Thyme

Oil of thyme is obtained by distillation from the leaves and flowering tops of *Thymus vulgaris* Linn. and other species of *Thymus*, indigenous to the countries bordering on the Mediterranean and now cultivated in most countries with a temperate climate. It occurs as a dark reddish-brown liquid, having a pleasant, strong, thyme odour and a biting, persistent taste, which is afterwards cooling. Spanish thyme oils are derived from species of *Origanum* which yield oils of similar composition.

Oil of thyme is also used under the name of oil of origanum, but the commercial oil of origanum is a mixture of oil of thyme and oil of turpentine. Oil of thyme **contains** about 45 per cent. of thymol and its isomeride, carvacrol. Other constituents are cymene, *l*-pinene, borneol, linalol and bornyl acetate.

Standard.—Oil of thyme, determined by the method of the British Pharmacopœia for eugenol in Oleum Caryophylli, contains not less than 40 per cent. v/v of phenols. Specific gravity, 0·905 to 0·960. Refractive index at 20°, 1·483 to 1·510. It is soluble in 2 volumes of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640).

Action and Uses.—Oil of thyme has antiseptic, antispasmodic and carminative properties, and is used in the treatment of whooping cough and bronchitis. Externally, it is employed in combination with olive oil and other oils as a rubefacient and counter-irritant in rheumatism, etc.

Dose.—0·06 to 0·3 millilitre (1 to 5 minims).

OLEUM MARJORANÆ.—Oil of marjoram is derived from *Origanum Marjorana* Linn. It consists principally of terpenes and is practically devoid of phenols. Specific gravity, 0 888 to 0·912; optical rotation, +13° to +20°.

OLEUM ORIGANI.—True origanum oil is derived from *Origanum hirtum* Link (Trieste) and *O. majoranoides* Willd. (Cyprus). The Cyprus oil is the better quality, containing 70 to 85 per cent. of carvacrol and having a specific gravity of 0·950 to 0·967. The Trieste oil may contain from 60 to 85 per cent. of carvacrol.

OLEUM THYMI ALBUM.—White oil of thyme is prepared by fractional distillation from oil of thyme. It has a lower specific gravity and contains from 20 to 30 per cent. of phenols.

OLIBANUM

(Oliban.)

Olibanum

Synonym—Frankincense.

Olibanum is the dried oleo-resinous secretion obtained from the bark of *Boswellia Carterii* Birdw. (Fam. Burseraceæ) and other species of *Boswellia*, small trees indigenous to Somaliland and Southern Arabia.

Olibanum occurs in small tears, from 5 to 25 millimetres in length, usually ovoid, and of a pale yellowish, bluish, or greenish colour. The surface is dusty, and dull after removal of the dust. Internally, it is dull, waxy and semi-translucent. In some softer samples the tears have become agglomerated into masses. The odour is agreeable and characteristically balsamic, and the taste is fragrant and slightly bitter, the tears easily breaking up and softening to a plastic mass on mastication.

Olibanum **contains** resin (60 to 70 per cent.) composed chiefly of a resin acid (boswellic acid) and a resene (olibanoresene) in about

equal proportions, gum (about 27 to 35 per cent.) consisting mainly of arabin with a little bassorin, and about 3 to 8 per cent. of a volatile oil. The volatile oil is colourless, pale yellow and fragrant, and varies in composition according to the method of preparation.

Uses.—Olibanum is used as an ingredient of incense and fumigating powders.

OLIVERI CORTEX
(Oliver. Cort.)
Oliver's Bark

Synonym—Black Sassafras.

Oliver's bark is the dried bark of *Cinnamomum Oliveri* Bailey (Fam. Lauraceæ), a tree indigenous to New South Wales and Queensland.

The bark occurs in flat pieces usually about 20 centimetres long, 4 centimetres wide and 1 centimetre thick. The outer surface is brownish, with patches of whitish cork, very coarsely granular or warty; the inner surface is amber-brown, finely striated, and satiny; the fracture is short and somewhat fibrous. The smoothed transverse section viewed under a lens shows a rhytidome of varying thickness, sometimes exhibiting alternating darker and paler lines of cells, and a thick, dark brown secondary phloem, containing numerous paler groups of stone cells and bast fibres. The odour is agreeable, recalling that of sassafras, and the taste is aromatic, slightly bitter and pungent.

Oliver's bark **contains** about 2·5 per cent. of a yellow volatile oil, which contains pinene, *d*-camphor, safrole and eugenolmethylether. The bark also contains tannin.

Action and Uses.—Oliver's bark is used in Australia as a substitute for cinnamon. It is **administered** in the form of a tincture (Tinctura Oliveri Corticis, 1 in 10 of alcohol (60 per cent.); dose, ½ to 1 fluid drachm).

OPIUM
(Opium)
Opium

Opium consists of the partly dried latex obtained from the unripe capsules of *Papaver somniferum* Linn. (Fam. Papaveraceæ). It is collected principally in Yugoslavia, Greece, Bulgaria, Asiatic Turkey, Persia, India and China. The capsules contain an extensive system of laticiferous vessels from which the latex drains when the capsules are incised. The nature of the incisions varies in different countries; they may be single or in groups, vertical, transverse, or oblique, but do not penetrate to the interior of the capsule in order to avoid loss of latex

and deterioration of the seeds. In the Balkans and Asiatic Turkey, the incision takes the form of a transverse cut extending spirally around the capsule, and one incision is made; in India one vertical cut is made with a three or four-bladed knife, each capsule being usually lanced at intervals of three days until no more latex exudes. The exuded juice, partly dried, is collected by scraping, further dried in various ways, and eventually formed into cakes or bricks which are then wrapped in poppy leaves or paper.

The characters of the different varieties of opium differ somewhat widely (see under varieties).

Opium **contains** the alkaloid, morphine, which occurs in commercial varieties in proportions varying from 5 to 21 per cent. of the dried opium. Opium, of any variety, containing much less than 10 per cent. of morphine is usually adulterated. The morphine exists in combination with meconic and sulphuric acids in the form of salts readily soluble in water. The "Soft Shipping" variety of Turkey opium contains about 15 to 18 per cent. of morphine, while "Druggists'" opium of good quality contains about 12 to 16 per cent., both calculated on the dried drug. Dried European opium contains from about 15 to 21 per cent. of morphine, or occasionally even more. Persian opium of good quality contains about 10 to 12 per cent., and occasionally as much as 13·5 per cent. of morphine. Undried Indian medicinal opium has varied considerably at different times, sometimes containing as little as 7 per cent., and sometimes as much as 12 per cent., while Indian smoking opium contains only from 4 to 6·5 per cent. of morphine. The proportion of narcotine, which exists partly in the free state and partly as a salt, ranges from 1·5 to 12·5 per cent., usually being from 2 to 7 per cent. Codeine is present to the extent of 0·3 to 4 per cent. in combination with acids, Indian opium containing the highest proportion and Turkey opium the lowest. The remaining alkaloids constitute about 1 per cent. of the drug. They include thebaine, narceine, papaverine, meconidine, codamine, laudanine, laudanosine, neopine, lanthopine, protopine, cryptopine, rhœadine, oxynarcotine, pseudomorphine, gnoscopine, xanthaline (papaveraldine), tritopine, hydrocotarnine, porphyroxine (in Indian opium) and possibly others. They exist partly in the free state and partly combined with meconic and sulphuric acids. Meconin, meconoidin and opionin are indifferent substances, present in small proportions only. Other constituents are mucilage, sugar, wax and rubber, together with salts of calcium, magnesium and potassium, but starch, tannin, calcium oxalate and fat do not normally occur, and their presence therefore indicates sophistication. Exhausted with water, undried opium gives an infusion which is acid in reaction, and it yields from 40 to 55 per cent. of dry aqueous extract; the latter contains most of the morphine present in the drug (constituting about 25 per cent. of the extract). The insoluble residue, examined under the microscope, contains not more than insignificant quantities of starch, and small quantities of the outer epidermis of the poppy capsule, portions of which are removed by the scraping,

and are more frequently found in "Druggists'" opium than in any other variety.

Varieties.—Turkey opium is produced in Asia Minor and occurs in rounded, conical, irregular, or flattened masses usually enveloped in poppy leaves, and sometimes more or less covered with the reddish-brown, triangular, winged fruits of a species of *Rumex*, in which the opium is packed in order to prevent the masses from adhering to one another. The weight of the cakes varies from about one ounce to several pounds, the majority of the pieces varying from about 1 to 4 pounds. Turkey opium includes two well-marked commercial varieties, "Soft Shipping" opium and "Druggists'" opium. As its name implies, "Soft Shipping" opium is usually fairly soft, the moisture content being sometimes as high as 30 per cent. or even more. The paste is smooth and homogeneous and varies considerably in colour, and the proportions of morphine and water-soluble matter are both high. "Druggists'" opium possesses a granular structure and is harder than "Soft Shipping" opium, the average moisture content being about 20 to 22 per cent., although it varies considerably and may be as low as 10 per cent. and as high as 25 per cent. The colour ranges from light reddish-brown to dark brown, depending partly upon the age of the drug. The percentage of morphine is appreciably lower than in "Soft Shipping" opium and the water-soluble matter decidedly less. European opium is produced chiefly in Bulgaria, Greece and Yugoslavia. It resembles the "Soft Shipping" variety of Turkey opium in its general characters, but on the average is of appreciably higher quality. Persian opium occurs in brick-shaped masses weighing about 1 pound, or rarely in cones or sticks of varying weight. The bricks are usually wrapped in red paper and tied with red or yellow string, but occasionally white paper is employed. This variety contains, on the average, less moisture than Turkey opium. It is homogeneous in character, and usually contains varying proportions of certain native gums which are added during the manufacture in order to obtain a product having a consistence suitable for moulding into bricks. Indian opium has been produced in two forms. Indian medicinal opium, which is used for medicinal purposes in India, occurs in square blocks weighing about 2 pounds and wrapped in paper which is sometimes oiled. It is dark brown or nearly black in colour, homogeneous, and possesses a somewhat disagreeable odour and a very bitter taste. It varies considerably in consistence, the moisture content ranging from 10 to 18 per cent. Indian smoking opium, as exported to China for many years, occurs in balls, about the size of a small Dutch cheese, which are enveloped in a casing made from poppy petals.

Standard, B.P.—Opium contains in its moist state, as imported, not less than 9·5 per cent. of morphine, calculated as anhydrous. The official description includes only the Turkey and European varieties.

Action and Uses.—The narcotic action of opium is primarily that of morphine, the other alkaloids present being responsible for its secondary effects. The important alkaloids have in all cases a narcotic action, the action decreasing according to the order of the alkaloids in the following series:—Morphine, papaverine, codeine, narcotine, thebaine. On the other hand, the effect on reflexes is a gradually increasing feature of the later members of the group, until in thebaine the stimulating action on the spinal cord entirely overshadows the depressant action on the cerebral hemispheres. The action of opium is exerted less rapidly than that of morphine, as absorption appears to take place less readily. Narcotine and papaverine relax intestinal muscle in contrast to morphine and codeine which increase its tone; this action increases the constipating effect of opium. The

action of opium on the intestine is, therefore, more prolonged and more marked than that of morphine, and on this account preparations of opium are preferred in the treatment of diarrhœa and intestinal disorders.

When opium is prescribed, Opium Pulveratum must be dispensed. Powdered opium and the extracts and tincture of opium are the usual forms for internal administration. As a diaphoretic, powdered opium is **administered** in the form of Pulvis Ipecacuanhæ et Opii in the early stages of colds, the dose being taken in a cachet, tablet, or powder. For the action of opium on the intestine, Pilulæ Plumbi cum Opio, Pulvis Cretæ Aromaticus cum Opio, and Pulvis Kino Compositus are employed. Pilulæ Saponis cum Opio is a sedative; Pilulæ Ipecacuanhæ cum Scilla, Tinctura Opii Camphorata, and Tinctura Opii Ammoniata are expectorants for use in coughs and colds. Lead and opium suppositories are used to relieve rectal and pelvic pain, and gall and opium ointment is a popular application to inflamed piles. Children are very susceptible to the action of opium. To those under the age of five years it should be given only with great caution, and in very small doses. It has been stated that the susceptibility in children applies only to infants still at the breast, and that after one year it appears to pass off. Opium is employed externally as Linimentum Opii, or the tincture is added to lotions, often with solution of lead subacetate. The opium alkaloids have, however, no action on motor or sensory nerve endings, and any good effect from their external application is due to absorption. The antidotes for use in cases of **poisoning** by opium are described under Morphina.

Preparations

Extractum Opii Liquidum, B.P.C.—(Ext. Opii Liq.)—Liquid Extract of Opium. It contains from 0·7 per cent. to 0·8 per cent. w/v of anhydrous morphine; 2 millilitres contains about 0·015 gramme, and 30 minims contains about ½ grain, of morphine. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

This liquid extract was included in the British Pharmacopœia, 1914.

Extractum Opii Siccum, B.P.—(Ext. Opii Sicc.)—Dry Extract of Opium. *Syn.*—Extractum opii aquosum I.A.; Extractum Opii. It is prepared with boiling water, and the macerate evaporated to dryness. It is adjusted with calcium phosphate to contain 20 per cent. of anhydrous morphine (limits, 19 to 21); 0·06 gramme contains 0·012 gramme, and 1 grain contains ⅓ grain, of morphine. It should be stored in small, wide-mouthed, well-closed containers in a cool place. Dose.– 0·015 to 0·06 gramme (¼ to 1 grain).

Linctus Camphoræ Compositus, B.P.C.—(Linct. Camph. Co.)—Compound Linctus of Camphor. Camphorated tincture of opium, 1 in 4, with emulsion of chloroform, syrup of wild cherry, oxymel of squill, solution of bordeaux B and concentrated infusion of senega. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Linctus Scillæ Compositus, B.P.C.—(Linct. Scill. Co.)—Compound Linctus of Squill. *Syn.*—Linctus Scillæ Opiatus; Opiate Linctus of Squill; Gee's Linctus. Equal parts of camphorated tincture of opium, oxymel of squill and syrup of tolu. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Linimentum Opii, B.P.C.—(Lin. Opii)—Liniment of Opium. Tincture of opium and liniment of soap, equal parts.

This liniment was included in the British Pharmacopœia, 1914.

Liquor Opii Sedativus, B.P.C.—(Liq. Opii Sed.)—Sedative Solution of Opium. It contains from 0·95 to 1·05 per cent. w/v of anhydrous morphine; 2 millilitres contains about 0·02 gramme, and 30 minims about $\frac{1}{3}$ grain, of morphine. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Lotio Plumbi cum Opio, B.P.C.—(Lot. Plumb. c. Opio)—Lead and Opium Lotion. Tincture of opium, 1 in 20, in dilute solution of lead subacetate.

Opium Pulveratum, B.P.—(Opium Pulverat.)—Powdered Opium. *Syn.*—Pulvis Opii; Pulvis opii I.A. Opium in fine or moderately fine powder adjusted with lactose to contain 10 per cent. of anhydrous morphine (limits, 9·5 to 10 5); 0·2 gramme contains 0·02 gramme, and 3 grains contain $\frac{1}{10}$ grain, of morphine. It should be stored in well-closed containers. Dose.– 0·03 to 0·2 gramme ($\frac{1}{2}$ to 3 grains).

Pilulæ Hydrargyri cum Creta et Opii, B.P.C.—(Pil. Hydrarg. c. Cret. et Opii)—Mercury with Chalk and Opium Pills. *Syn.*—Hutchinson's Pills. Each pill contains 1 grain of mercury with chalk and 1 grain of powder of ipecacuanha and opium. Dose.– 1 pill.

Pilulæ Ipecacuanhæ cum Scilla, B.P.C.—(Pil. Ipecac. c. Scill.)—Ipecacuanha Pills with Squill. Each pill contains 2 grains of powder of ipecacuanha and opium, and $\frac{2}{3}$ grain each of squill and ammoniacum. Dose.– 1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914, under the name of Pilula Ipecacuanhæ cum Scilla.

Pilulæ Plumbi cum Opio, B.P.C.—(Pil. Plumb. c. Opio)—Lead Pills with Opium. Each pill contains $1\frac{1}{2}$ grains of lead acetate and about $\frac{1}{4}$ grain of powdered opium. Dose.– 1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914, under the name of Pilula Plumbi cum Opio.

Pilulæ Saponis cum Opio, B.P.C.—(Pil. Sap. c. Opio)—Soap Pills with Opium. *Syn.*—Pilulæ Saponis Compositæ; Compound Soap Pills. Each pill contains $\frac{2}{3}$ grain of powdered opium and about 1 grain of hard soap. Dose.– 1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914, under the name of Pilula Saponis Composita.

Pulvis Cretæ Aromaticus cum Opio, B.P.—(Pulv. Cret. Aromat. c. Opio)—Aromatic Powder of Chalk with Opium. Powdered opium, 2·5 per cent., with aromatic powder of chalk. It contains 0·25 per cent. of anhydrous morphine (limits, 0·235 to 0·265); 4 grammes contains 0·01 gramme, and 60 grains about $\frac{1}{4}$ grain, of morphine. Dose.– 0·6 to 4 grammes (10 to 60 grains).

Pulvis Ipecacuanhæ et Opii, B.P.—(Pulv. Ipecac. et Opii)—Powder of Ipecacuanha and Opium. *Syn.*—Pulvis opii et Ipecacuanhæ compositus I.A.; Pulvis Ipecacuanhæ Compositus; Compound Powder of Ipecacuanha; Dover's Powder. Powdered ipecacuanha and powdered opium, of each 10 per cent., with lactose. It contains 1 per cent. of anhydrous morphine (limits, 0·95 to 1·05); 0·6 gramme contains 0·006 gramme, and 10 grains contains $\frac{1}{10}$ grain, of morphine. Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Pulvis Kino Compositus, B.P.C.—(Pulv. Kino Co.)—Compound Powder of Kino. Kino, 75 per cent., and powdered opium, 5 per cent., with cinnamon. Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

This powder was included in the British Pharmacopœia, 1914.

Pulvis Opii Compositus, B.P.C.—(Pulv. Opii Co.)—Compound Powder of Opium. Powdered opium, 1 in 10, with pepper, ginger, caraway, and tragacanth. Dose.– 0·3 to 1 gramme (5 to 15 grains).

This powder was included in the British Pharmacopœia, 1914.

Suppositorium Plumbi cum Opio, B.P.—(Supp. Plumb. c. Opio)—Suppository of Lead with Opium. *Syn.*—Suppositorium Plumbi Compositum. Each suppository contains 0·2 gramme (3 grains) of lead acetate and 0·06 gramme (1 grain) of powdered opium, equivalent to about 0·006 gramme ($\frac{1}{10}$ grain) of anhydrous morphine.

Tabellæ Plumbi cum Opio, B.P.C.—(Tab. Plumb. c. Opio)—Tablets of Lead with Opium. Each tablet contains 3 grains of lead acetate, ½ grain of powdered opium, and sucrose. Dose.– 1 tablet.

Tinctura Opii, B.P.—(Tinct. Opii)—Tincture of Opium. *Syn.*—Laudanum. It is prepared by extracting opium with boiling water and alcohol. It contains 1 per cent. w/v of anhydrous morphine (limits, 0·95 to 1·05); 2 millilitres contains 0·02 gramme, and 30 minims contains about ⅓ grain, of morphine. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Tinctura opii I.A. is prepared with alcohol (70 per cent.) and contains 1 per cent. of anhydrous morphine. Sirupus opii I.A. contains 0·05 per cent. of anhydrous morphine. Sirupus opii dilutus seu Sirupus diacodii I.A. contains 0·01 per cent. of anhydrous morphine.

Tinctura Opii Ammoniata, B.P.C.—(Tinct. Opii Ammon.)—Ammoniated Tincture of Opium. Tincture of opium, 1 in 10, and solution of ammonia, 1 in 5, with benzoic acid and oil of anise. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

Tinctura Opii Camphorata, B.P.—(Tinct. Opii Camph.)—Camphorated Tincture of Opium. *Syn.*—Tinctura opii benzoica I.A.; Tinctura Camphoræ Composita; Compound Tincture of Camphor; Paregoric; Paregoric Elixir. Tincture of opium, 5 per cent. v/v, with benzoic acid, camphor, oil of anise and alcohol (60 per cent.). It contains 0·05 per cent. w/v of anhydrous morphine (limits 0·045 to 0·055); 4 millilitres contains 0·002 gramme, and 1 fluid drachm contains about $\frac{1}{30}$ grain, of morphine. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tinctura Opii Crocata, B.P.C.—(Tinct. Opii Croc.)—Tincture of Opium with Saffron. *Syn.*—Sydenham's Laudanum. It is prepared from opium, cinnamon, clove and saffron and contains from 0·95 per cent. to 1·05 per cent. w/v of anhydrous morphine; 2 millilitres contains about 0·02 gramme, and 30 minims contains about ⅓ grain, of morphine. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Unguentum Gallæ cum Opio, B.P.C.—(Ung. Gall. c. Opio)—Gall and Opium Ointment. *Syn.*—Unguentum Gallæ Compositum. Powdered opium, 7·5 per cent., in gall ointment.

This ointment was included in the British Pharmacopœia, 1914.

ORTHOCAINA

(Orthocain.)

Orthocaine

$C_8H_9O_3N = 167·1$

Orthocaine, $HO·C_6H_3(NH_2)·COOCH_3$, is the methyl ester of *m*-amino-*p*-hydroxybenzoic acid. It may be prepared by reducing the product of nitration of *p*-hydroxybenzoic acid and esterifying with methyl alcohol. Orthocaine occurs as an odourless and tasteless, white or yellowish-white, crystalline powder. It is decomposed by boiling with water or by warming with alkalis, with formation of methyl alcohol and *p*-hydroxybenzoic acid or an alkali salt. The saturated aqueous solution gives a fugitive red colour on the addition of ferric chloride solution. On the addition of a 10 per cent. w/v aqueous solution of sodium nitrite to a 5 per cent. solution of orthocaine in

water acidified with hydrochloric acid, the liquid assumes a yellowish colour, and yields an orange-yellow precipitate which deepens to red on exposure to air. A solution of orthocaine in dilute hydrochloric acid may be distinguished from a solution of benzocaine by the absence of a precipitate on the addition of solution of iodine, and from solutions of procaine hydrochloride or amylocaine hydrochloride by the absence of a precipitate on the addition of potassio-mercuric iodide solution.

Slightly **soluble** in water; soluble in alcohol (90 per cent.) (1 in 7), ether (1 in 50); readily soluble in sodium hydroxide solution.

Standard, B.P.—Orthocaine has a melting-point of 141° to 143°. Loss on drying at 100°, not more than 1 per cent. Ash, not more than 0·1 per cent. A 10 per cent. w/v solution in alcohol (90 per cent.) is neutral to litmus, and colourless or not more than faintly yellow. It complies also with a test for absence of chloride.

Action and Uses.—Orthocaine, when applied to abraded surfaces, acts as a local analgesic and antiseptic. It is used as a dusting powder or as an ointment, 10 to 20 per cent. in wool fat or soft paraffin, for application to burns and painful ulcers of the skin, but it has been reported to produce severe irritation and even necrosis, hence it must be used with great care. It has been recommended for internal use to relieve the pain of gastric ulceration, simple or malignant, but in practice no great benefit is observed. As an insufflation, it is applied to the larynx in tuberculous ulceration.

Dose.– 0·1 to 0·2 gramme (1½ to 3 grains).

OS SEPIÆ
(Os Sep.)
Cuttle Fish Bone

Cuttle fish bone is the internal shell of *Sepia officinalis* Linn. (Class Cephalopoda), a large mollusc common around the coasts of Great Britain and abundant in the Mediterranean and Adriatic Seas.

It occurs in ovate, flattened pieces, having two convex surfaces, from 10 to 25 centimetres long, 4 to 8 centimetres broad and a maximum thickness of 15 to 35 millimetres. Each shell has on one side a thin, hard, almost white, chitinous coat, upon which friable, white, calcareous layers have been deposited, which are easily crushed by moderate pressure and retain the form of the indentation. The odour is faint, and the taste saline and earthy.

Cuttle fish bone **contains** calcium carbonate (80 to 85 per cent.), small quantities of sodium chloride and calcium phosphate, and 10 to 15 per cent. of organic matter.

Standard.—Cuttle fish bone yields not more than 0·6 per cent. of acid-insoluble ash.

Cuttle fish bone, in powder (Pulvis Ossis Sepiæ : Pulv. Os. Sep.), contains the constituents of and complies with the standard for the unground drug.

Uses.—Cuttle fish bone is used as an ingredient of tooth powders.

SEPIA is prepared from the fluid in the ink gland of the cuttle fish by drying the secretion, dissolving it in caustic soda and reprecipitating by the addition of acid. It is used as a homœopathic remedy.

OVOLECITHINUM
(Ovolecithin.)
Ovolecithin

Synonym—Lecithin.

Ovolecithin may be prepared from dried egg-yolk by extraction with alcohol or ethyl acetate, and precipitation of the lecithin from the concentrated solution by the addition of acetone. When so prepared, the product consists of a mixture of true lecithin and a similar compound, kephalin. Ovolecithin is a member of the group of bodies known as the "phosphatides" (substances containing fatty acids, nitrogen and phosphorus), which are in turn classed with the fat-like substances known as "lipins." Numerous lecithins occur in nature, differing slightly in composition. Egg-yolk contains about 10 per cent. Lecithins occur in plants, particularly in leguminous seeds. Many plant lecithins contain considerably less phosphorus than ovolecithin. Soya beans contain about 1·6 per cent. of a lecithin which is a commercial article.

Ovolecithin contains about 4 per cent. of phosphorus and 1·8 per cent. of nitrogen. Animal lecithins contain small amounts of cholesterol, while those of plant origin contain phytosterol. Pure ovolecithin is choline distearylglycerophosphate, and on hydrolysis with alkalis, choline, stearic acid and glycerophosphoric acids are formed. In kephalin, the choline is replaced by aminoethyl alcohol, and one of the stearic acid groups by linolic acid. Ovolecithin occurs as a brown or yellow, translucent, waxy mass, becoming darker on exposure to air.

Soluble in alcohol, ether, chloroform, benzene and light petroleum; insoluble in acetone.

Standard.—Ovolecithin contains not less than 3·5 per cent. of P.

Assay.—Mix about 0·5 gramme, accurately weighed, with 5 grammes of a mixture of equal parts of sodium carbonate and potassium nitrate, cover in a crucible with a layer of sodium carbonate, and ignite; dissolve the residue in dilute nitric acid, make alkaline with solution of ammonia, and add a slight excess of magnesium ammonio-sulphate solution; filter, wash the precipitate with solution of ammonia (2·5 per cent. w/v), ignite, and weigh the residue of $Mg_2P_2O_7$; 1 gramme of residue is equivalent to 0·2786 gramme of P.

Action and Uses.—Ovolecithin is employed chiefly for its action in improving the nutrition of the nervous system. It has a favourable effect on general nutrition, increasing the body weight. It is stated to increase the number of red corpuscles and to raise their hæmoglobin content; it is also, although only when injected, a powerful agent for inducing leucocytosis. It is given in neurasthenia, tuberculosis and malnutrition. Ovolecithin is **administered** as an emulsion or elixir, or in the form of pills, 0·1 gramme (1½ grains) in each, massed with powdered althæa and a mixture of alcohol and glycerin as excipients. For intramuscular injection, a solution (5 per cent.) in sterilised olive oil is prepared, sometimes with the addition of guaiacol, eucalyptol and iodoform. Preparations for **injection** may be made by mixing the ovolecithin with an oily medium which has been heated at 150° for one hour, and after distributing the final product into sterilised containers, subjecting them to tyndallisation.

Dose.– 0·2 to 0·5 gramme (3 to 8 grains).

ACETYLCHOLINA.–Acetylcholine, $(CH_3)_3N(OH)CH_2{\cdot}CH_2{\cdot}O{\cdot}CO{\cdot}CH_3$, occurs as a white, hygroscopic, crystalline powder with a saline, bitter taste and a characteristic odour. It is stated to be 100,000 times as active as choline on arterial pressure but only three times as toxic. Acetylcholine hydrochloride is given by subcutaneous or intramuscular injection in doses of 0·02 to 0·2 gramme (⅓ to 3 grains) dissolved at the time of use in 5 millilitres of sterilised water; intravenous administration is dangerous. It is employed in the treatment of arterial hypertension, Raynaud's disease and paralytic ileus.

CHOLINA.—Choline, $(CH_3)_3N(OH)CH_2{\cdot}CH_2OH$, may be obtained from ovolecithin or produced synthetically by the interaction of trimethylamine and ethylene oxide in aqueous solution. Choline hydrochloride is administered intravenously in doses of 0·6 gramme (10 grains) dissolved in 180 millilitres of physiological solution of sodium chloride in the treatment of ileus.

Preparations

Elixir Ovolecithini, B.P.C.—(Elix. Ovolecithin.)—Elixir of Ovolecithin. *Syn.*— Elixir Lecithini; Elixir of Lecithin. Each fluid drachm contains 1 grain of ovolecithin with yolk of egg, tincture of lemon, glycerin and distilled water. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Pilulæ Ovolecithini, B.P.C.—(Pil. Ovolecithin.)—Ovolecithin Pills. *Syn.*— Pilulæ Lecithini; Lecithin Pills. Each pill contains 1½ grains of ovolecithin and $\frac{1}{60}$ grain of strychnine hydrochloride. Dose.– 1 to 4 pills.

OXYGENIUM

(Oxygen.)

Oxygen

O = 16·000

Oxygen may be prepared by the fractional distillation of liquid air or by the electrolysis of water. If prepared by the former method, the gas will contain a small proportion of argon and a trace of nitrogen; if prepared by the second method it will contain a small proportion of

hydrogen. It is supplied compressed in metal cylinders. Oxygen occurs as a colourless, odourless and tasteless gas. It supports combustion, and causes a glowing splinter of wood to burst into flame when placed in the gas. Oxygen may be distinguished from nitrous oxide by the red fumes produced when it is mixed with an equal volume of nitric oxide.

Standard, B.P.—Oxygen contains not less than 98 per cent. v/v of O_2. It complies with limit tests for carbon dioxide, halogens, acids or alkalis, and oxidising substances.

Action and Uses.—Oxygen inhalation is indicated principally in anoxæmia, which may be due to impeded respiration, as in pneumonia, pulmonary œdema and bronchitis, to a low hæmoglobin content of the blood, as in anæmia, or to a lack of oxyhæmoglobin, as in carbon monoxide poisoning. It is also of great value in respiratory failure due to post-operative pulmonary complications. During oxygen inhalation it has been observed that there is a fall in temperature, and also a fall in the respiratory and pulse rates. The application of oxygen therapy in cardiac disease is limited, though it may be of service in angina if the attacks are frequent. For this purpose, oxygen in fairly high concentration should be administered during the attack and stopped as soon as the spasms cease. An attack of asthma may be relieved promptly by similar treatment. It should be noted that, when once oxygen therapy has commenced, the supply should be continuous so long as its use is indicated, and the withdrawal of oxygen treatment should be gradual, especially in cases of chronic cyanosis. The concentration of oxygen for inhalation over long periods should be about 50 per cent. at sea level; it must never exceed 60 per cent., except at high altitudes, when as much as 80 per cent. may be necessary, or when the administration is for short periods only. The addition of 1 per cent. or more of carbon dioxide to oxygen stimulates the respiratory centre and causes deeper breathing, and such a mixture is often used with this purpose in view. The addition of much over 2 per cent. of carbon dioxide causes laboured breathing; more than 5 per cent. may be dangerous. Concentrations of 5 per cent. or more have, however, been found of value in the treatment of carbon monoxide poisoning, post-operative collapse, etc. It must not be forgotten that carbon dioxide is given off during respiration, and so precautions must be taken to prevent the carbon dioxide concentration from rising above about 1·5 per cent. The possibility of there being a great accumulation of carbon dioxide naturally depends largely on the type of apparatus used; increased depth of respiration is a sign that the carbon dioxide concentration is increasing.

Oxygen is **administered** in various ways. The most elaborate methods are by means of the "oxygen chamber" and the "oxygen tent." Simpler, but less efficient, methods are by the use of a mask, or by the introduction of a catheter through the nose, and often it is bubbled through warm water, alcohol, or brandy. Metal cylinders containing compressed oxygen should be fitted with a suitable reducing

valve by which the rate of flow of oxygen can easily be controlled. It is very important that the reducing valve should be free from all traces of oil, otherwise a violent explosion may occur. Also, if the reducing valve is of the rubber bellows type, the tap of the reducer should always be opened before opening the main oxygen tap on the cylinder; opening the main tap with the reducing valve tap closed has been known to cause spontaneous fire. Further, when the oxygen chamber is being used, great care must be exercised to prevent persons unthinkingly entering the room with a lighted cigarette or pipe.

PANCREATINUM
(Pancreatin.)

Pancreatin

Pancreatin is a preparation obtained from the pancreas, or sweetbread, of certain animals commonly used for food which contains the enzymes, trypsin, amylase and lipase. It is usually obtained from the pancreas of the pig or ox. Pancreatin may be extracted by macerating one part of pancreas in four parts of alcohol (25 per cent.). It occurs as a somewhat hygroscopic, white or buff-coloured, amorphous powder having a meat-like odour. Its proteolytic activity is destroyed by treatment with more than traces of mineral acids, and it is thereby distinguished from pepsin, which is active only in acid solution; the activity of pancreatin is also destroyed by strong alkalis and by heat. When dissolved in water, it is precipitated by heat, acids, metallic salts, strong alcohol and tannic acid, but not by saturated solution of sodium chloride, in this last respect differing from pepsin. Pancreatin may be identified by its ability to digest fibrin in alkaline solution, and a solution containing pancreatin acquires a red colour when maintained at 38° in the presence of congo-red fibrin at a *p*H of 8·0. It should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in water, forming a slightly turbid solution; insoluble in alcohol (90 per cent.) and ether.

Standard, B.P.—Pancreatin possesses not less than a minimum activity in respect of trypsin, lipase and amylase.

Action and Uses.—Pancreatin is employed principally as an aid to starch and protein digestion. For this purpose it is useless if given directly after a meal, since the active ferments contained in it are destroyed by acid pepsin solution. It is, therefore, **administered** two to three hours after a meal, when the acidity of the stomach should have diminished somewhat, preferably associated with sodium bicarbonate or, alternatively, in glutoid capsules or tablets which have been rendered insoluble in the stomach. Pancreatin may also be given in the form of Liquor Pancreatini about three hours after a meal.

For the preparation of "pre-digested" protein foods, Liquor Pancreatini, Pulvis Pancreatini Compositus and Tabellæ Pancreatini are

used. For peptonising milk, 25 grains of compound pancreatin powder or two pancreatin tablets are added to 5 fluid ounces of tepid water in a flask. One pint of milk, previously heated to 38°, is then added. The temperature of the mixture is maintained at 38° for fifteen minutes and then raised to boiling-point, after which it should be transferred to a cool place until required for use. The peptonised milk should not be used when it has been kept for more than twenty-four hours, or after it has acquired a bitter taste. Alternatively, milk may be peptonised by dissolving 25 grains of compound pancreatin powder or two pancreatin tablets in 5 fluid ounces of tepid water, adding a pint of luke-warm milk, stirring, and allowing the mixture to stand in a warm place for ten to fifteen minutes, or longer if complete peptonisation is desired. At the end of this time heat the milk to boiling-point, allow to cool, and keep standing on ice. The peptonising process can be arrested at any desired stage by boiling the milk and so destroying the pancreatic enzymes. Gruel, arrowroot and other farinaceous articles of diet may be similarly pre-digested. Peptonised beef tea may be prepared by simmering for two hours half a pound of finely-minced lean beef with a pint of water, to which a saltspoonful of sodium bicarbonate has been added. The mixture is cooled to about 60°, two pancreatin tablets, crushed to powder, are added, and the whole set aside in a warm place for two hours, after which it is boiled for five minutes and strained. Such a solution contains a much larger proportion of nutritive material than ordinary beef tea.

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

Preparations

Glycerinum Pancreatini, B.P.C.—(Glycer. Pancreatin.)—Glycerin of Pancreatin. Pancreatin, 1 in 10, with glycerin, simple elixir and distilled water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Liquor Pancreatini, B.P.C.—(Liq. Pancreatin.)—Solution of Pancreatin. *Syn.*—Liquor Pancreatis; Pancreatic Solution. Glycerin of pancreatin, about 1 in 6, with sodium bicarbonate, glycerin, alcohol (90 per cent.) and distilled water. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

The pancreatic solution of the British Pharmacopœia, 1914, was prepared by macerating 250 grammes of the fresh pancreas of the pig with a mixture of 250 millilitres of alcohol (90 per cent.), 200 millilitres of glycerin and sufficient distilled water to produce 1000 millilitres.

Mistura Bismuthi et Pancreatini, B.P.C.—(Mist. Bism. et Pancreatin.)—Mixture of Bismuth and Pancreatin. Each fluid ounce contains 10 grains each of bismuth carbonate and sodium bicarbonate, 4 grains of pancreatin, and 4 minims of dilute hydrocyanic acid, in chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Pulvis Pancreatini Compositus, B.P.C.—(Pulv. Pancreatin. Co.)—Compound Pancreatin Powder. *Syn.*—Peptonising Powder; Pulvis Pancreaticus Compositus. Pancreatin, 1 in 5, with sodium bicarbonate.

Pulvis Pepsini Compositus, B.P.C.—(Pulv. Pepsin. Co.)—Compound Pepsin Powder. Pepsin, about 1 in 6, pancreatin, 1 in 10, and diastase, 1 in 100, with lactic acid, hydrochloric acid and lactose. Dose.– 0·6 to ·2 grammes (10 to 30 grains).

Tabellæ Pancreatini, B.P.C.—(Tab. Pancreatin.)—Pancreatin Tablets. *Syn.*—Peptonising Tablets. Each tablet contains 2½ grains of pancreatin and 10 grains of sodium bicarbonate.

PAPAINUM
(Papain.)
Papain

Papain is an impure proteolytic enzyme, or mixture of enzymes, prepared from the juice of the unripe fruit of *Carica Papaya* Linn., a native of South America, the West Indies and other tropical parts. The juice is always more or less acrid or even vesicant, but processes for destroying its acridity weaken its digestive properties. Papain may be obtained by adding to the freshly drawn, milky juice twice its volume of alcohol, the precipitate formed being drained and dried. By dissolving the crude papain in water, and reprecipitating with alcohol, it is obtained as a light-coloured product.

Papain occurs as an amorphous, slightly granular powder, varying in colour from white to light brown, nearly odourless, and having a faint pepsin-like taste. It is very liable to deteriorate. It possesses a digestive action on proteins, and is distinguished from other proteoses by acting in slightly acid, alkaline, or neutral media. Its activity is considerably affected by the presence of salts, and the addition of traces of hydrocyanic acid is stated to increase the activity two or threefold. For this reason, statements as to the optimum temperature and the optimum *p*H are conflicting. It is active between 37° and 70°, and is destroyed at about 80° in solution, although it is stated that the dry powder may be heated to 100° without destruction.

Standard.—The amino-acids, produced by 1 gramme of papain in the assay process, require for neutralisation not less than 20 millilitres of N/10 sodium carbonate. Ash, not more than 1 per cent.

Assay.—Dissolve 4 grammes of soluble casein in 50 millilitres of hot water, cool, neutralise to phenolphthalein, and dilute with water to 100 millilitres. Triturate 0·2 gramme of papain, accurately weighed, with a few millilitres of water, and wash into 30 millilitres of the casein solution; add 10 millilitres of N/10 sodium carbonate, and dilute to 50 millilitres; to 20 millilitres of the mixture add 20 millilitres of water and 20 millilitres of formaldehyde solution neutralised to phenolphthalein, and titrate immediately with N/10 hydrochloric acid using phenolphthalein as indicator. Warm the remainder of the mixture to 37°, and keep at this temperature for six hours; remove 20 millilitres (equivalent to 0·08 gramme of papain), add 20 millilitres of water and 20 millilitres of formaldehyde solution previously neutralised to phenolphthalein, and titrate with N/10 hydrochloric acid to the same end-point as in the previous titration. Calculate, from the difference in the two titrations, the number of millilitres of N/10 sodium carbonate neutralised by the amino-acids formed by 1 gramme of papain.

Action and Uses.—Papain is employed to assist protein digestion in chronic dyspepsia, gastric fermentation and gastritis. Its activity is exerted both in acid and in alkaline solutions. It may be **administered** in powders, pills, tablets, or cachets, or in solution as Elixir Papaini or

Glycerinum Papaini. Injections of solution of papain have been given to prevent adhesions.

Dose.- 0·12 to 0·6 gramme (2 to 10 grains).

Preparations

Elixir Papaini, B.P.C.—(Elix. Papain.)—Elixir of Papain. Each fluid drachm contains about 3 grains of papain with alcohol (90 per cent.), distilled water and aromatic elixir. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Glycerinum Papaini, B.P.C.—(Glycer. Papain.)—Glycerin of Papain. Papain, 9 per cent. w/v, with dilute hydrochloric acid, simple elixir and glycerin. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Liquor Papaini et Iridini, B.P.C.—(Liq. Papain. et Iridin.)—Solution of Papain and Iridin. Each fluid drachm contains 1 grain each of papain and extract of iris, with glycerin, alcohol (90 per cent.) and chloroform water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

PAPAVERETUM

(Papaveret.)

Papaveretum

Synonym—Opium Concentratum.

Papaveretum consists of the hydrochlorides of alkaloids of opium. It may be prepared from opium by converting the total alkaloids into the hydrochlorides and adjusting the mixture to contain 50 per cent. of anhydrous morphine, or by mixing suitable proportions of the hydrochlorides of morphine, codeine, papaverine and other principal opium alkaloids. It occurs in powder, varying in colour from white to light brown or brownish-grey, and having a slightly acid reaction to litmus. It gives a purple colour with sulphomolybdic acid, a green colour with ferric chloride solution, and a violet to purple colour when heated with sulphuric acid and a trace of ferric chloride.

Soluble in water (about 1 in 15), more soluble in hot water, less soluble in alcohol.

Standard.—Papaveretum contains not less than 47·5 per cent. and not more than 52·5 per cent. of anhydrous morphine.

Assay.—Take 1 gramme, accurately weighed, wash into a separator with 20 millilitres of water, add 5 millilitres of N/1 sodium hydroxide and 50 millilitres of ether, and shake thoroughly; separate the lower layer and run into a second separator containing 25 millilitres of ether, and again shake well; separate the lower layer and filter, if necessary, through a tightly-packed plug of cotton wool into a 50 millilitre graduated flask; wash the ether in the two separators with a mixture of 2·5 millilitres of N/1 sodium hydroxide and 5 millilitres of water, and then with successive portions of about 5 millilitres of water, filtering if necessary, until 50 millilitres of liquid has been collected. Then proceed as directed in the British Pharmacopœia for the assay of

opium commencing at "Transfer to a small conical flask....," but collecting the morphine on a small filter paper instead of on a plug of cotton wool; each millilitre of N/10 sulphuric acid is equivalent to 0·02852 gramme of anhydrous morphine; to the amount indicated by the titration add 0·025 gramme in order to correct for the loss of morphine due to its solubility.

Action and Uses.—Papaveretum has been recommended for use in place of opium, to which it is said to be superior since it may be given hypodermically, and, when given orally, it is regarded as less constipating. Papaveretum is usually **administered** hypodermically, but may be given in tablet form by the mouth. A 2 per cent. solution in a mixture of 3 parts of water and 1 part of glycerin is suitable for internal administration or for hypodermic injection. It is stated to exert a better sedative and soporific action than morphine, and also to have milder secondary effects. It is given with hyoscine as a sedative before the administration of a general anæsthetic; in such cases a smaller quantity of anæsthetic is required, whilst post-operative shock and pain are usually reduced. It is also administered with hyoscine and atropine in the production of partial anæsthesia and twilight sleep. Preparations for **injection** may be sterilised by heating at 100° for thirty minutes. They should be stored protected from light.

Dose.– 0·01 to 0·02 gramme ($\frac{1}{6}$ to $\frac{1}{3}$ grain); 0·005 to 0·01 gramme ($\frac{1}{12}$ to $\frac{1}{6}$ grain), by injection.

PAPAVERINA

(Papaverin.)

Papaverine

$C_{20}H_{21}O_4N = 339·2$

Papaverine is one of the minor alkaloids of opium, and may be obtained from the mother liquors of opium extract after the separation of morphine and codeine, by precipitation with ammonia, crystallisation from alcohol and final purification through the acid oxalate (melting-point, 196° to 199°), which, unlike that of the accompanying narcotine, is sparingly soluble in alcohol. Papaverine occurs in rhombic prisms or needles, or as a white, crystalline powder, without odour or taste, and is optically inactive. Its solution in alcohol is alkaline to litmus. Many of the colour reactions ascribed to papaverine are said to be due to associated cryptopine, but the following are due to papaverine itself. A solution of 0·01 gramme in 5 millilitres of cold sulphuric acid is colourless, becomes rose-red at 110°, darkens to violet at 200°, and the colour is discharged on the addition of water. Papaverine slowly gives a rose-red colour with sulphuric acid containing solution of formaldehyde. On the addition of potassium ferricyanide to a faintly acid solution of papaverine, a lemon-yellow precipitate of

papaverine ferricyanide is obtained which, when washed and dried, dissolves in sulphuric acid containing formaldehyde, giving a pale blue colour darkening to bluish-violet.

It is sparingly **soluble** in ether and cold alcohol, more soluble in chloroform and hot alcohol; almost insoluble in water.

Standard.—Papaverine melts between 146° and 147°. Ash, not more than 0·1 per cent.

Action and Uses.—Papaverine has an antispasmodic action, but in therapeutic doses it has no effect on normal muscle. It is useful to relieve spasmodic contraction of the muscle of the gastro-intestinal and bronchial tracts. It does not act on the gastric or intestinal secretions, and does not cause constipation; it has given satisfactory results in spasm of the biliary ducts. Papaverine has no action on the heart. It exerts powerful hypotensive action when the hypertension is due to arterial spasm, and is indicated in angina pectoris associated with dyspnœa and insomnia. In asthma and spasmodic coughs, such as whooping cough, this alkaloid has proved effective. It has also mild analgesic properties. Papaverine is usually **administered** as the sulphate or hydrochloride either orally in the form of cachets or tablets, or hypodermically, and may be given with other antispasmodics such as benzyl benzoate or benzyl succinate.

Dose.– 0·12 to 0·25 gramme (2 to 4 grains).

PAPAVERINÆ HYDROCHLORIDUM. — Papaverine hydrochloride, $C_{20}H_{21}O_4N,HCl$, may be prepared by the addition of hydrochloric acid to an alcoholic solution of the base or by treating a solution of papaverine oxalate with a solution of calcium chloride. It occurs as a colourless, odourless, crystalline powder. The aqueous solution is acid to litmus. On the addition of a concentrated solution of sodium acetate to a solution of papaverine hydrochloride, a transient opalescence is produced and, on standing, papaverine crystallises out. Papaverine hydrochloride gives the colour reactions described under papaverine; it melts between 210° and 220°. It is soluble (about 1 in 40) in water and in alcohol. Solutions of papaverine hydrochloride may be sterilised by heating at 70° for thirty minutes on three successive days, or by filtration. Dose.– 0·12 to 0·25 gramme (2 to 4 grains).

PAPAVERINÆ SULPHAS.—Papaverine sulphate, $(C_{20}H_{21}O_4N)_2,H_2SO_4$, may be prepared by the addition of sulphuric acid to an alcoholic solution of papaverine. It occurs as a colourless, crystalline powder which is sparingly soluble in water. Solutions of papaverine sulphate may be sterilised by heating at 70° for thirty minutes on three successive days, or by filtration. Dose.– 0·12 to 0·25 gramme (2 to 4 grains).

PAPAVERIS CAPSULA

(Papav. Cap.)

Poppy Capsule

Synonym—Poppy Heads.

Poppy capsule consists of the dried fruits of *Papaver somniferum* Linn. (Fam. Papaveraceæ), probably indigenous to Asiatic Turkey, but

now cultivated in England. They are collected before dehiscence has taken place.

The fruits are ovoid or nearly globular in shape, sometimes depressed at the base and apex, 5 to 7·5 centimetres in diameter, crowned with a large stellate stigma with 12 to 15 rays, and contracted at the base to a neck, which is enlarged near the peduncle. The fruit is pale yellowish-brown in colour, often marked with darker spots. From the inner surface of the thin, brittle pericarp, membranous placentæ, equal in number to the rays of the stigma, project into the cavity of the fruit, but do not meet at the centre; dehiscence is by pores just beneath the stigma. The numerous seeds are 1 to 1·25 millimetres long, almost white in colour, reniform, and marked with conspicuous, raised reticulations with straight edges and about 120 microns in width. The capsules are odourless, but have a slightly bitter taste.

Poppy capsule **contains** about 0·1 to 0·3 per cent. of morphine, and traces of narcotine, codeine, papaverine and meconic acid. The seeds are devoid of alkaloid, but contain about 50 per cent. of a drying oil (poppy seed oil); they should be rejected when making galenical preparations of poppy capsule.

Action and Uses.—Poppy capsule is mildly sedative by virtue of the small proportion of the active constituents of opium it contains. It is employed in the preparation of fomentations for bruises, and for dental and other abscesses. Decoctum Papaveris et Anthemidis Forte is similarly employed. Syrupus Papaveris is a mild sedative for use in cough mixtures.

Preparations

Decoctum Papaveris et Anthemidis Forte, B.P.C.—(Dec. Papav. et Anthem. Fort.)—Strong Decoction of Poppy and Chamomile. *Syn.*—Decoctum Papaveris et Anthemidis Concentratum. Chamomile and poppy capsule, of each, 1 in 4, with alcohol (90 per cent.) and distilled water.

Extractum Papaveris Liquidum, B.P.C.—(Ext. Papav. Liq.)—Liquid Extract of Poppy. *Syn.*—Liquor pro Syrupo Papaveris. It contains from 0·16 to 0·18 per cent. w/v of anhydrous morphine; 2 millilitres contains about 0·003 gramme, and 30 minims about $\frac{1}{12}$ grain, of morphine. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Syrupus Papaveris, B.P.C.—(Syr. Papav.)—Syrup of Poppy. Liquid extract of poppy, 1 in 8, in syrup. It contains about 0·02 per cent. w/v of anhydrous morphine; 1 fluid drachm contains about $\frac{1}{60}$ grain. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

PARADICHLORBENZENUM

(Paradichlorbenz.)

Paradichlorbenzene

$C_6H_4Cl_2 = 146·9$

Paradichlorbenzene, or *p*-dichlorobenzene, may be obtained, together with monochlorobenzene, by the chlorination of benzene, from

which it may be separated by fractional distillation. It occurs in colourless, shining crystals, with a powerful, characteristic odour. It slowly volatilises in the air, and boils at about 172°.

Soluble in benzene, ether and hot alcohol.

Standard.—Paradichlorbenzene melts between 53° and 54°. Ash, not more than 0·1 per cent.

Uses.—Paradichlorbenzene is an insecticide, particularly useful against moths and furniture beetles. For the control of the former, paradichlorbenzene should be scattered between the folds of clothing in a tightly-closed container, such as a trunk, one pound being used for every 10 cubic feet of space. In the control of furniture beetles, the compound is best applied in the form of a paste containing paradichlorbenzene, 5 parts, thick mineral oil, 5 parts, and soap, 2 parts. Applications should be made during the spring.

ORTHODICHLORBENZENUM.—Orthodichlorbenzene, or *o*-dichlorobenzene, is a heavy, colourless liquid, having a characteristic odour. It boils at about 179°. Orthodichlorbenzene is an insecticide used in the control of furniture beetles. The undiluted compound may be sprayed into the holes produced by the beetles in the furniture, or a mixture of orthodichlorbenzene and kerosene may be used in a similar manner. A mixture of orthodichlorbenzene, 9 parts, with soap, 7 parts, and oil of cedar wood, 1 part, is also used for the treatment of wood attacked by the death-watch beetle.

PARADISI GRANA

(Parad. Gran.)

Grains of Paradise

Synonym—Guinea Grains.

Grains of paradise consists of the seeds of *Aframomum Melegueta* Rosc. (Fam. Zingiberaceæ), a herbaceous plant attaining about 1·5 metres in height, indigenous to the West Coast of Africa.

The seeds vary considerably in shape, but are mostly sub-pyramidal with rounded or obtuse angles, and have the paler fibrous remains of the funiculus projecting from the pointed extremity. They are reddish-brown in colour, and measure about 3 millimetres in length, the surface being shiny and minutely papillose. A longitudinal section exhibits a white, starchy perisperm and a central, horny endosperm within which is a pale-coloured embryo, with the radicle pointing towards the funiculus. The seeds have a faintly aromatic odour and an intensely pungent taste.

Grains of paradise **contains** about 0·3 to 0·7 per cent. of volatile oil, and a yellowish, oily substance, paradol, the pungency of which is not destroyed by boiling with a 2 per cent. solution of potassium hydroxide.

Action and Uses.—Grains of paradise has carminative properties, and is employed in veterinary practice.

PARAFFINUM DURUM

(Paraff. Dur.)

Hard Paraffin

Hard paraffin is a mixture of solid members of the methane series of hydrocarbons, ranging from $C_{21}H_{44}$ to $C_{30}H_{62}$. It is obtained chiefly from the crude tarry oil produced by the destructive distillation of shale. The oil is redistilled, the distillate is shaken with sulphuric acid to remove basic bodies, and then with sodium hydroxide to remove acidic substances. The product is washed and distilled, yielding various burning and lubricating oils, and finally a thick oil which deposits a crude hard paraffin on cooling. It may also be obtained from petroleum. Hard paraffin occurs as a colourless or white, translucent, wax-like, odourless, tasteless solid, frequently showing a crystalline structure; it is slightly unctuous to the touch. When heated strongly in air, it burns with a luminous flame, although not readily. It is characterised by a marked indifference to most chemical reagents.

Insoluble in water and cold alcohol (90 per cent.); soluble in ether and chloroform.

Standard, B.P.—Hard paraffin has a melting-point of 50° to 60°. Ash, not more than 0·05 per cent. It complies also with a test for limit of acidity.

Action and Uses.—Hard paraffin is employed principally in the preparation of ointment bases for use with medicaments that are not required to be absorbed. It may be sterilised by heating at 150° for one hour. Hard paraffin, melting-point 43° to 46°, is used in plastic operations, especially to correct nasal deformities. The substance known as "Paraffin No. 7" is prepared by mixing 25 parts of soft paraffin and 5 parts of olive oil with 67 parts of melted hard paraffin, then adding 1 part of resorcinol dissolved in a little alcohol and, when the mixture has cooled to 55°, adding 2 parts of oil of eucalyptus. The melting-point is about 48°. It is used as a protective covering for burns and wounds. Hard paraffin is also used for embedding substances when cutting microscopical sections.

CERESINA.—Ceresin, or cerasin, is usually a mixture of purified ozokerites, obtained from the naturally occurring solid paraffin found in the neighbourhood of petroleum springs and obtained chiefly in Galicia, with varying proportions of hard paraffin. It occurs as a colourless, odourless, waxy solid, melting between about 60° and 70°. It is insoluble in water, slightly soluble in alcohol (90 per cent.), readily soluble in ether, chloroform and benzene. Ceresin is used as a substitute for white wax and in the manufacture of candles and polishes.

PARAFFINUM LIQUIDUM

(Paraff. Liq.)

Liquid Paraffin

Liquid paraffin is a mixture of liquid hydrocarbons consisting

chiefly of members of the methane series, ranging from $C_{16}H_{34}$ to $C_{21}H_{44}$. It is obtained from petroleum by distilling off most of the lighter fractions and purifying the liquid residue. Liquid paraffin differs somewhat in composition according to the source of the petroleum from which it is obtained. It occurs as a transparent, colourless, oily liquid, free from fluorescence when viewed by daylight, and almost free from odour and taste.

Insoluble in water and alcohol (90 per cent.); soluble in boiling dehydrated alcohol, ether, chloroform, carbon disulphide, amyl alcohol, benzene, light petroleum, oil of turpentine and many fixed and volatile oils.

Standard, B.P.—Liquid paraffin has a specific gravity of 0·880 to 0·895. 50 millilitres at 37·8° flows from a Redwood viscometer in not less than 260 seconds. Heated with an equal volume of nitrogen-free sulphuric acid in a test-tube in a boiling water-bath for ten minutes, the colour produced is not deeper than pale brown. It complies with limit tests for solid paraffins, sulphur compounds and for acidity.

Action and Uses.—Liquid paraffin is not irritating when applied to mucous surfaces. Given internally, it acts as a lubricant; to the large intestine it has been found of service in hæmorrhoids, chronic colitis, chronic constipation and other intestinal disorders. The desired lubricating property of the oil increases with its viscosity. It is not a food, and cannot, therefore, act as a substitute for cod-liver oil. It is a suitable vehicle in which to suspend insoluble salts, such as calomel, mercury salicylate, etc., for intramuscular injection. For preparing sprays, light liquid paraffin is preferable (see Paraffinum Liquidum Leve). Liquid paraffin is used as an emollient to the skin in irritable conditions, and to remove desquamative crusts. It may be used with oil immersion lenses in place of cedar wood oil but is less effective for this purpose. Liquid paraffin is **administered** internally alone, as an emulsion, or with phenolphthalein or magnesium hydroxide. When required for injection, or for application to septic wounds, it may be sterilised by heating at 150° for one hour.

Dose.– 7·5 to 30 millilitres (¼ to 1 fluid ounce).

PARAFFINUM CHLORINATUM.—Chlorinated paraffin, or chlorcosane, may be prepared by treating liquid paraffin, 20 parts, with potassium chlorate, 0·1 part, and hydrochloric acid, 0·5 part, in a wide-mouthed glass bottle and allowing the mixture to stand until chlorine ceases to be evolved; the mixture is placed in direct sunlight until the odour of chlorine and the yellow colour of the chlorinated oil have disappeared, and is shaken in a separator with a slight excess of sodium carbonate solution; the chlorinated product, is separated, washed with water until free from alkali and dried by means of anhydrous calcium chloride. Chlorinated paraffin is used as a solvent for dichloramine.

Preparations

Emulsio Paraffini Liquidi Alkalina, B.P.C.—(Emuls. Paraff. Liq Alk.)—Alkaline Emulsion of Liquid Paraffin. Mixture of magnesium hydroxide, 25 per cent. v/v, with emulsion of liquid paraffin with agar. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Emulsio Paraffini Liquidi Composita, B.P.C.—(Emuls. Paraff. Liq. Co.)—Compound Emulsion of Liquid Paraffin. *Syn.*—Emulsion of Liquid Paraffin with Agar and Phenolphthalein. Emulsion of liquid paraffin with agar containing 1½ grains of phenolphthalein in each fluid ounce. Dose.—4 to 16 millilitres (1 to 4 fluid drachms).

Emulsio Paraffini Liquidi cum Agar, B.P.C.—(Emuls. Paraff. Liq. c. Agar)—Emulsion of Liquid Paraffin with Agar. It contains 50 per cent. v/v of liquid paraffin, with agar. Dose.—4 to 16 millilitres (1 to 4 fluid drachms).

Emulsio Paraffini Liquidi cum Glycerophosphatibus, B.P.C.—(Emuls. Paraff. Liq. c. Glycerophosph.)—Emulsion of Liquid Paraffin with Glycerophosphates. *Syn.*—Emulsio Petrolei cum Glycerophosphatibus; Emulsion of Petroleum with Glycerophosphates. It contains 50 per cent. v/v of liquid paraffin with the glycerophosphates of calcium, magnesium, iron, sodium and potassium. Dose.—4 to 16 millilitres (1to 4 fluid drachms).

Emulsio Paraffini Liquidi cum Hypophosphitibus, B.P.C.—(Emuls. Paraff. Liq. c. Hypophosph.)—Emulsion of Liquid Paraffin with Hypophosphites. *Syn.*—Emulsio Petrolei cum Hypophosphitibus; Emulsion of Petroleum with Hypophosphites. It contains 50 per cent. v/v of liquid paraffin with 1 grain each of the hypophosphites of calcium and sodium in each fluid drachm. Dose.—4 to 16 millilitres (1 to 4 fluid drachms).

Emulsio Paraffini Liquidi et Kaolini, B.P.C.—(Emuls. Paraff. Liq. et Kaolin.)—Emulsion of Liquid Paraffin and Kaolin. It contains liquid paraffin, 25 per cent. v/v, and kaolin, 18·75 per cent. w/v; each fluid ounce contains 2 fluid drachms of liquid paraffin and about 80 grains of kaolin. Dose.—16 to 60 millilitres (½ to 2 fluid ounces).

Mistura Magnesii Hydroxidi et Paraffini Liquidi, B.P.C.—(Mist. Magnes. Hydrox. et Paraff. Liq.)—Mixture of Magnesium Hydroxide and Liquid Paraffin. Liquid paraffin, 30 per cent. v/v, with mixture of magnesium hydroxide, flavoured with vanillin. Dose.—4 to 16 millilitres (1 to 4 fluid drachms).

Parogenum, B.P.C.—(Parogen.)—Parogen. *Syn.*—Liquid Parogen; Vasoliment. Liquid paraffin, 40 per cent. v/v, with oleic acid, ammoniated alcohol and alcohol (90 per cent.).

PARAFFINUM LIQUIDUM LEVE

(Paraff. Liq. Lev.)

Light Liquid Paraffin

Synonyms—Spray Paraffin; Paraffinum Liquidum pro Nebulis.

Light liquid paraffin is a mixture of liquid hydrocarbons obtained by distillation from petroleum. It occurs as a transparent, colourless, oily liquid which, when cold, is almost devoid of odour. Light liquid paraffin has a lower specific gravity and a lower viscosity than Paraffinum Liquidum.

Insoluble in water and alcohol (90 per cent.); soluble in boiling dehydrated alcohol, ether and chloroform; miscible with benzene, light petroleum, fixed and volatile oils.

Standard.—Light liquid paraffin has a specific gravity of from 0·835 to 0·850. 50 millilitres at a temperature of 37·8° flows from a Redwood No. 1 viscometer in not less than 60 and not more than 80 seconds. It complies also with the limit tests for sulphur compounds and acidity in Paraffinum Liquidum.

Action and Uses.—Light liquid paraffin is employed as a vehicle for oily spray solutions containing ephedrine, menthol, thymol and the volatile oils. For the preparation of solutions of the alkaloids, arachis oil is preferable, or almond oil, 1 part, may be mixed with light liquid paraffin, 2 parts. Light liquid paraffin is preferred to liquid paraffin for use in sprays since, being less viscous, it is more readily broken up by the spray apparatus into the necessary fine particles for projection into the air passages. It is erroneously regarded as a nutritive application for the hair, and forms the basis of many brilliantines.

PARAFFINUM MOLLE ALBUM

(Paraff. Moll. Alb.)

White Soft Paraffin

White soft paraffin is a mixture of semi-solid hydrocarbons usually obtained from petroleum, and bleached. A similar product may be obtained from the tar produced by the distillation of coal at temperatures below 500°. Products of inferior quality may be obtained by melting together suitable proportions of liquid and hard paraffins. White soft paraffin occurs as a white, soft, translucent mass, unctuous to the touch, and not more than slightly fluorescent when viewed in daylight, even when melted. It is odourless and tasteless.

Insoluble in water and alcohol (90 per cent.); soluble in ether, chloroform, benzene and fixed or volatile oils.

Standard, B.P.—White soft paraffin has a refractive index at 60° of 1·453 to 1·460. Melting-point, 40° to 46°. In other respects it complies with the characters and tests for purity for Paraffinum Molle Flavum.

Action and Uses.—White soft paraffin is used as a basis for medicaments in a similar manner to yellow soft paraffin. It is used in the preparation of paraffin ointment when the latter is used for white ointments. White soft paraffin may be sterilised by heating at 150° for one hour.

Preparations

Parenol, B.P.C.—(Paren.)—Parenol. *Syn.*—Solid Parenol. An emulsion of water in a mixture of wool fat, 15 per cent., and white or yellow soft paraffin, 65 per cent.

Unguentum Paraffini, B.P.—(Ung. Paraff.)—Paraffin Ointment. White beeswax, 2 per cent., and hard paraffin, 8 per cent., in white soft paraffin or yellow soft paraffin. When it is used in a white ointment, it should be prepared with white soft paraffin and when used in a coloured ointment, it should be prepared with yellow soft paraffin.

Unguentum Simplex, B.P.—(Ung. Simp.)—Simple Ointment. Wool fat, 5 per cent., in a mixture of hard and soft paraffins. When it is used in a white ointment it should be prepared with white soft paraffin and when used in a coloured ointment, it should be prepared with yellow soft paraffin.

PARAFFINUM MOLLE FLAVUM

(Paraff. Moll. Flav.)

Yellow Soft Paraffin

Yellow soft paraffin is a mixture of semi-solid members of the methane series, mainly ranging from $C_{15}H_{32}$ to $C_{20}H_{42}$. It is usually obtained from the residue remaining when crude petroleum is distilled. A similar product may be obtained from the tar produced by the distillation of coal at temperatures below 500°, or from shale oil. It occurs as a pale yellow or yellow, soft, translucent, unctuous mass which is not more than slightly fluorescent when viewed in daylight, even when melted. It is free or nearly free from odour and taste.

Insoluble in water and alcohol (90 per cent.); soluble in ether, chloroform, benzene and fixed or volatile oils.

Standard, B.P.—Yellow soft paraffin has a refractive index at 60° of 1·460 to 1·474. Melting-point, 38° to 46°. Ash, not more than 0·05 per cent. It volatilises when heated without emitting an acrid odour. When boiled with alcohol, the alcohol is not coloured yellow and is not rendered acid to litmus. It complies also with a test for absence of fixed oils, soaps and resin.

Action and Uses.—Yellow soft paraffin is not irritating when applied to the skin. It is used as a basis for medicaments which are not intended to be absorbed. It is an excellent emollient, and the best ointment basis for reducible substances, especially mercuric salts. Yellow soft paraffin is employed in the preparation of paraffin ointment when the latter is used for coloured ointments. Paraffin ointment is a protective to the skin; it adheres to the dressing, leaving wounds clean. Ointments prepared with soft paraffin melt at the temperature of the body and soak into the dressing. Yellow soft paraffin with wool fat is the pharmacopœial basis for ointments to be applied to the eyes. It is administered in doses of 4 to 8 grammes (1 to 2 drachms) as a lubricant for the intestinal tract. Yellow soft paraffin may be sterilised by heating at 150° for one hour.

Preparations

Oculentum Simplex, B.P.C.—(Oculent. Simp.)—Simple Eye Ointment. Wool fat, 1 in 10, with yellow soft paraffin.

This eye ointment is of the same composition as the basis for Ointments for the Eye of the British Pharmacopœia, 1932.

Parenol, B.P.C.—(Paren.)—Parenol. *Syn.*—Solid Parenol. An emulsion of water in a mixture of wool fat, 15 per cent., and white or yellow soft paraffin, 65 per cent.

Unguentum Paraffini, B.P.—(Ung. Paraff.)—Paraffin Ointment White beeswax, 2 per cent., and hard paraffin, 8 per cent., in white soft paraffin or yellow soft paraffin. When it is used in a white ointment it should be prepared with white soft paraffin, and when used in a coloured ointment it should be prepared with yellow soft paraffin.

Unguentum Simplex, B.P.—(Ung. Simp.)—Simple Ointment. Wool fat, 5 per cent., in a mixture of hard and soft paraffins. When it is used in a white ointment it should be prepared with white soft paraffin, and when used in a coloured ointment it should be prepared with yellow soft paraffin.

PARAFORMALDEHYDUM

(Paraformaldehyd.)

Paraformaldehyde

Paraformaldehyde, $(CH_2O)_3$, is a solid polymeride of formaldehyde. It may be prepared by evaporating a concentrated aqueous solution of formaldehyde, or by adding to solution of formaldehyde about a fourth of its weight of sulphuric acid. It occurs as a white, amorphous powder, or as a white, friable, amorphous mass, odourless at ordinary temperatures, but having a pungent odour on heating. Its solution in hot water exhibits the chemical properties of formaldehyde. It volatilises at 100°, and is readily converted into formaldehyde when heated to this temperature in the presence of water. The addition of potassium permanganate to a suspension of paraformaldehyde also causes the liberation of formaldehyde. 0·04 gramme warmed with 10 millilitres of sulphuric acid containing 0·2 gramme of salicylic acid produces a deep red colour.

Insoluble in water; soluble in boiling water (with depolymerisation) and solutions of the fixed alkali hydroxides.

Standard. Paraformaldehyde, determined by the method of the British Pharmacopœia for Liquor Formaldehydi, contains not less than 95 per cent. of $(CH_2O)_3$; each millilitre of N/1 sodium hydroxide is equivalent to 0·03002 gramme of $(CH_2O)_3$. Ash, not more than 0·1 per cent. 20 millilitres of water shaken with 1 gramme of paraformaldehyde is neutral to litmus.

Action and Uses.—Paraformaldehyde is employed to disinfect rooms, by vaporising it in a suitable lamp. About 20 grammes of paraformaldehyde are required to disinfect thoroughly 1000 cubic feet of enclosed space. To keep catheters and other surgical instruments aseptic, it is enclosed with them in air-tight containers. It is used whenever formaldehyde is required in solid form, as in tablets or lozenges, for taking internally or for preparing antiseptic solutions. Tablets prepared for disinfecting rooms by vaporisation should be coloured by the addition of a suitable blue dye. Paraformaldehyde suspended in flexible collodion (25 per cent.) has been recommended as an efficacious application for warts.

Preparation

Tabellæ Formaldehydi, B.P.C.—(Tab. Formaldehyd.)—Tablets of Formaldehyde. *Syn.*—Formaldehyde and Menthol Tablets; Formalin Throat Tablets; Formamint Tablets. Each tablet contains about $\frac{1}{7}$ grain of paraformaldehyde and $\frac{1}{75}$ grain of menthol, with citric acid, terpeneless oil of lemon, acacia and sucrose. Dose.– 1 or 2 tablets.

PARALDEHYDUM
(Paraldehyd.)
Paraldehyde

Paraldehyde is a mixture of polymerides of acetaldehyde, and may be prepared by treating acetaldehyde with small quantities of sulphuric acid, hydrochloric acid, or zinc chloride; the temperature of the liquid rises with almost complete conversion into paraldehyde. Under different conditions, different mixtures of polymerides may be obtained. Paraldehyde occurs as a colourless, transparent liquid with a strong, characteristic odour and a disagreeable, acrid, pungent and subsequently cooling taste. At a low temperature it solidifies to a crystalline mass. Heated with dilute sulphuric acid, it is converted into acetaldehyde, and when warmed with ammoniacal silver nitrate solution a silver mirror is produced. It should be **stored** in small, well-closed, completely-filled bottles, in a cool place and protected from light. If it has solidified, the whole of the contents of the bottle should be liquefied before use.

Soluble in water (1 in 9); miscible with alcohol (90 per cent.), ether, chloroform and volatile oils.

Standard, B.P.—Paraldehyde has a specific gravity of 0·998 to 1·000. Not more than 10 per cent. v/v distils below 123°, and the remainder distils between 123° and 126°. Melting-point, not below 11°. It complies also with limit tests for acidity, acetaldehyde and peroxidised compounds.

Action and Uses.—Paraldehyde is a hypnotic resembling chloral hydrate in its action, but has a less depressant action on the heart and is more rapidly absorbed. It produces an intoxication similar to that produced by alcohol. Owing to this action, the patient may be excited to the point of delirium, and no sleep may be obtained. Small doses are more liable to be excitant than large doses. It is eliminated in part by the lungs but mainly in the urine. It is especially useful in mental and cardiac diseases and in the delirium of fever, but is contra-indicated in bronchitis and pneumonia owing to its irritating effect on the lungs. It is a valuable remedy in spasmodic asthma, dilating the bronchioles by its depressant action on the medullary vagal centre. Administration over long periods may cause addiction, and may necessitate an increase in the effective dose; it may also give rise to an erythematous rash. Large doses may irritate the alimentary canal owing to its irritating action on the mucous membrane; because of this effect, and owing to its disagreeable taste, paraldehyde is best **administered** dissolved in at least 16 parts of water, the taste being disguised with liquid extract of liquorice, tincture of orange or cinnamon water, or it may be given in capsules. In greater concentration than 1 in 9 it may be suspended with compound powder of tragacanth. For the rapid inducement of general anæsthesia, 6 to 15 millilitres (1½ to 4 fluid drachms) of paraldehyde with an equal amount of ether in 150 millilitres (5 fluid ounces) of physiological solution of sodium

chloride may be injected intravenously; doses up to 45 millilitres (1½ fluid ounces) in olive oil may be given as an enema. Tetanus has been treated with the same mixture, 5 millilitres (75 minims) being injected intravenously once or twice a day, increasing to 15 millilitres (225 minims). Saline injections should be given alternately. In cases of **poisoning** by paraldehyde, which is due to respiratory failure, oxygen and strychnine may be administered.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

ALDEHYDUM.—Acetaldehyde, $CH_3 \cdot CHO$, may be obtained by the oxidation of ethyl alcohol or synthetically from ethylene. It occurs as a colourless, inflammable liquid with a suffocating odour. Specific gravity, about 0·80; boiling-point, about 21°. It combines with ammonia, forming aldehyde ammonia, $CH_3 \cdot CHOH \cdot NH_2$. It is miscible with water, alcohol and ether. Aldehyde, when inhaled in concentrated form, causes excitement, anæsthesia and, finally, asphyxia. It is used medicinally as Aldehydum Dilutum, a 15 per cent. v/v solution of aldehyde in alcohol. As an antiseptic inhalation in nasal catarrh and ozœna, one minim of diluted aldehyde is added to two fluid ounces of water at 60°.

ALDEHYDUM DECYLICUM.—Decylic aldehyde, $CH_3(CH_2)_8 \cdot CHO$, may be prepared synthetically and occurs as an oily liquid having a specific gravity of 0·828 to 0·834 and a boiling-point of about 212°. It is used in perfumery.

ALDEHYDUM DUODECYLICUM.—Duodecylic aldehyde, or laurinic aldehyde, $CH_3(CH_2)_{10} \cdot CHO$, may be prepared synthetically. It occurs as a solid melting at about 44° and is used in perfumery.

ALDEHYDUM METHYLNONYLICUM.—Methylnonyl aldehyde, $(C_6H_{13})(CH_3)CH \cdot CH_2 \cdot CHO$, may be prepared synthetically and occurs as a liquid boiling at about 100° under 12 mm. pressure. It has a powerful aromatic odour, and is used in perfumery.

METALDEHYDUM.—Metaldehyde, $(C_2H_4O)_x$ is another polymer of acetaldehyde and occurs as a crystalline solid, insoluble in water, almost insoluble in alcohol and ether, and soluble in hot chloroform and benzene. It sublimes at 100°. Metaldehyde is very inflammable and is used in tablet form for heating purposes. It is poisonous when taken internally and the usual precautions should be observed during storage.

PARATHYROIDEUM

(Parathyroid.)

Parathyroid

Parathyroid consists of the external parathyroid glands of oxen, freed from fat, dried and powdered. The fresh gland yields about one-tenth of its weight of parathyroid, which occurs as a pale yellowish powder, with only a slight odour. The parathyroids are small glands which in most animals are situated in close anatomical relationship to the thyroids. They are composed of epithelium-like cells, either in the form of a compact mass, or divided up into trabeculæ by strands of vascular connective tissue. Sometimes these two structures may be observed in different parts of the same gland. Parathyroid should be free, or almost free, from thyroid or thymus tissue. It contains no iodine.

Action and Uses.—In development and function the parathyroids are quite independent of the thyroids. Two functions have been assigned to the parathyroid glands; the regulation of calcium metabolism and the detoxication of certain metabolic poisons. Removal of the parathyroids causes a condition in animals and man of neuromuscular irritability, known as tetany. In tetany following parathyroidectomy there is an excess of guanidine in the blood and urine. The administration of guanidine leads to symptoms identical with those of tetany, and consequently it has been thought that tetany is caused by an excess of guanidine in the blood. In tetany, also, there is a grave diminution of calcium in the blood. Injections of calcium control the spasms. In the treatment of tetany, the most satisfactory results are obtained by the subcutaneous injection of parathyroid extract (see Extractum Parathyroidei); parathyroid has also been given by the mouth, but with very variable results. Similarly, parathyroid has been given orally in eclampsia, uræmia, epilepsy, paralysis agitans, and vasomotor disturbances such as angioneurotic œdema and Raynaud's disease, and for the relief of chilblains. It is, however, doubtful if it is possible to raise the calcium content of the blood by the oral administration of parathyroid. Parathyroid has also been employed in chronic toxic conditions resulting from sepsis, in which there is usually some deficiency of ionic calcium in the blood. Such conditions may give rise to varicose ulcers, and to ulcerations of the alimentary canal, and the successful use of parathyroid therapy has been reported. It has also been advocated in rickets in children, in osteomalacia and in sprue. Parathyroid may be **administered** in tablets with calcium lactate, but it is more satisfactory to give parathyroid extract by injection.

Dose.– 0·003 to 0·006 gramme ($\frac{1}{20}$ to $\frac{1}{10}$ grain).

Preparations

Tabellæ Parathyroidei et Calcii et Sodii Lactatis, B.P.C.—(Tab. Parathyroid. et Calc. et Sod. Lact.)—Tablets of Parathyroid and Calcium Sodium Lactate. Each tablet contains 7½ grains of calcium sodium lactate and $\frac{1}{40}$ grain of parathyroid. Dose.– 1 to 4 tablets.

Tabellæ Parathyroidei et Calcii Lactatis, B.P.C.—(Tab. Parathyroid. et Calc. Lact.)—Tablets of Parathyroid and Calcium Lactate. Each tablet contains 5 grains of calcium lactate and $\frac{1}{40}$ grain of parathyroid. Dose.– 1 to 4 tablets.

PEGANUM
(Pegan.)

Harmal

Synonyms—Hurmal; Armel; Syrian Rue.

Harmal consists of the dried seeds of *Peganum Harmala* Linn. (Fam. Rutaceæ), a bushy herb growing in North-Western India.

The seeds are of a dull earthy-brown colour, with a reticulated seed coat; they are irregularly angular in shape, varying from segments of a sphere to triangular pyramids. The seeds are from 2·5 to 4 millimetres long and from 1·5 to 3 millimetres broad; the longitudinally cut surface exhibits a greyish-white endosperm, which is oily and encloses a large, straight, yellowish embryo, occupying the whole length of the seed; 100 seeds weigh from 0·23 to 0·25 gramme. The crushed seeds impart to alcohol or to water a blue fluorescence. The drug has an unpleasant odour, becoming heavy and narcotic when crushed, and a bitter taste.

Harmal **contains** the alkaloids, harmaline, $C_{13}H_{14}ON_2$, harmine, $C_{13}H_{12}ON_2$ (melting-point, 260° to 265°), and harmalol, $C_{12}H_{12}ON_2$. The salts of harmine show a blue fluorescence in aqueous solution. Harmine is identical with an alkaloid known as banisterine or telepathine, obtained from *Banisteria Caapi* Spruce (Fam. Malpighiaceæ), and also with the alkaloid, yageine, from *Hæmadictyon amazonicum* Benth. (Fam. Apocynaceæ).

Action and Uses.—The properties of harmal are due to harmine and harmalol which have been employed in malaria and paralysis agitans, and as uterine stimulants.

HARMALOL HYDROCHLORIDUM.—Harmalol hydrochloride has been administered hypodermically in doses of 0·025 gramme (⅜ grain), and by the mouth in doses of 0·5 to 0·75 gramme (8 to 12 grains)

HARMINÆ HYDROCHLORIDUM.—Harmine hydrochloride has been administered by injection in doses of 0·02 gramme (⅓ grain), the injection being given two or three times a week. The effects are transient and must be augmented by stramonium or hyoscine.

PELLETIERINÆ TANNAS

(Pellet. Tann.)

Pelletierine Tannate

Pelletierine tannate is a mixture of the tannates of the alkaloids, pelletierine, *iso*pelletierine, pseudopelletierine and methylpelletierine, obtained from pomegranate bark. It occurs as a light yellow, amorphous, odourless powder, with an astringent taste, and is soluble in warm dilute acids. When heated, it darkens in colour, becoming brown at about 150°; at about 165° it softens, and at higher temperatures it is decomposed without melting. The aqueous solution has an acid reaction and reduces silver nitrate solution; it gives a bluish-black colour with ferric chloride solution, and a white precipitate with solutions of salts of lead, mercury and zinc; no precipitate is produced with platinic chloride solution.

Soluble in water (about 1 in 700) and alcohol (90 per cent.) (1 in 80); insoluble in chloroform.

Standard, B.P.—Pelletierine tannate leaves on ignition not more

than 0·1 per cent. of residue. It complies also with a test for absence of many foreign alkaloids.

Action and Uses.—Pelletierine tannate has a specific action on tape-worm and is used as a tænicide; other intestinal worms are less susceptible to its action. Pelletierine tannate may be **administered** in cachets or suspended in water. It should be given on an empty stomach and followed after one or two hours by a brisk purge. The treatment may be preceded by doses of 2 grammes (30 grains) of sodium bicarbonate three times a day for two days.

Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

PELLETIERINA.—Pelletierine, or punicine, occurs as a colourless, volatile, oily liquid becoming brown on exposure to the air, and having a peculiar, aromatic odour. It is soluble in water (1 in 23), the solution having a strongly alkaline reaction, and in all proportions of alcohol, ether and chloroform. Pelletierine has properties similar to those of pelletierine tannate, but the latter is preferred on account of its greater insolubility in the stomach and consequent decreased tendency to absorption. Absorption may give rise to symptoms of intoxication resembling those caused by male fern. Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

PELLETIERINÆ SULPHAS.—Pelletierine sulphate is mainly a mixture of the sulphates of pelletierine and *iso*pelletierine, obtained by converting the total alkaloids of pomegranate into sulphates and precipitating the other alkaloids by saturating the aqueous solution with sodium carbonate. After extraction with chloroform, sodium hydroxide solution is added to the aqueous layer and the pelletierine and *iso*pelletierine now precipitated are extracted with chloroform and finally converted into the sulphates. It occurs in the form of colourless crystals which tend to become yellow, and is soluble in water. It is usually administered in conjunction with tannin. Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

PEPSINUM
(Pepsin.)
Pepsin

Pepsin is a substance containing a proteolytic enzyme present in the gastric juices of animals. It is obtained from the mucous membrane of the stomach of certain animals commonly used for food, particularly the pig, sheep, or calf. It may be prepared by mincing the mucous membrane of the stomach and macerating it in slightly acidified water, or in a mixture of glycerin and water. The pepsin is precipitated from the filtered liquid by the addition of a neutral salt such as ammonium sulphate; the precipitate is suspended in water and freed from the salt by dialysis, and the aqueous solution is evaporated *in vacuo* or scaled.

Pepsin occurs as a colourless or light buff-coloured, amorphous powder, or as translucent granules or scales; it has a faint meat-like odour and a slightly acid or saline taste. It readily absorbs moisture on exposure to air, particularly when in powder, this property being due to the presence of peptone. The activity of pepsin is destroyed by the presence of more than traces of sodium chloride, by boiling, or by heating in a slightly alkaline solution. In very dilute hydrochloric acid

solution, pepsin possesses proteolytic activity; if a solution in N/50 hydrochloric acid is divided into two portions, one of which is boiled, on adding a small quantity of carmine-fibrin to each portion and warming at 38° to 40° for one hour, the unboiled solution is stained red, while the boiled liquid remains almost colourless. Varieties of pepsin are obtainable in commerce which will dissolve up to 10,000 times their weight of coagulated egg albumen. Pepsin may be adjusted to the required strength by admixture with lactose. It should be **stored** in well-closed containers in a cool place.

Soluble in water, forming an opalescent solution; insoluble in alcohol (90 per cent.) and ether.

Standard, B.P.—Pepsin dissolves not less than 2500 times its weight of coagulated egg albumen.

Action and Uses.—The digestive or solvent action of pepsin on proteid substances only occurs in acid solution, 0·4 per cent. of hydrogen chloride being about the optimum strength. It dissolves natural insoluble protein, albumin and fibrin, converting them first into soluble acid albumose, and subsequently into peptone. Pepsin is used in therapeutics to increase the digestive power of the gastric juice when there is a deficiency of ferment. This is known to occur in the aged who suffer from chronic wasting diseases, but there is reason to believe that inactivity of the gastric secretion is more often due to deficiency of acid than to deficiency of ferment, especially in cancer.

Pepsin is best **administered** in mixtures as Glycerinum Pepsini. It may also be dispensed in pills, massed with syrup of liquid glucose, or in powders or tablets. Pepsin should not be taken until half an hour after a meal. It should be noted that in the presence of acid, pepsin destroys pancreatin, and that in neutral solution, pancreatin destroys pepsin. Pepsin is immediately destroyed by alkalis, and its activity is not restored by subsequent acidification. Such combinations are therefore therapeutically unsound. Pepsin in solution is **incompatible** with alkalis or alkali carbonates and with preparations of the pancreatic ferments, and, in the presence of more than 0·5 per cent. of hydrogen chloride, its proteolytic activity is inhibited and eventually destroyed.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Preparations

Elixir Pepsini, B.P.C.—(Elix. Pepsin.)—Elixir of Pepsin. Each fluid drachm contains about 5 grains of pepsin, with alcohol (90 per cent.), distilled water and aromatic elixir. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Glycerinum Pepsini, B.P.C.—(Glycer. Pepsin.)—Glycerin of Pepsin. Pepsin, 10 per cent. w/v, with hydrochloric acid, glycerin and distilled water. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

This glycerin was included in the British Pharmacopœia, 1914.

Glycerinum Pepsini Fortius, B.P.C.—(Glycer. Pepsin. Fort.)—Stronger Glycerin of Pepsin. *Syn.*—Glycerol of Pepsin. Pepsin, 15 per cent. w/v, with dilute hydrochloric acid, glycerin, simple elixir and distilled water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Liquor Euonymini et Pepsini, B.P.C.—(Liq. Euonym. et Pepsin.)—Solution of Euonymin and Pepsin. Each fluid drachm contains 1 grain of extract of euonymus and 2 grains of pepsin, with hydrochloric acid, alcohol (45 per cent.) and chloroform water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Liquor Pepticus, B.P.C.—(Liq. Pept.)—Peptic Solution. Stronger glycerin of pepsin, 1 in 8, with dilute hydrochloric acid, alcohol (90 per cent.) and distilled water. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Mistura Bismuthi Composita Acida cum Pepsino, B.P.C.—(Mist. Bism. Co. Acid. c. Pepsin.)—Compound Acid Mixture of Bismuth with Pepsin. Each fluid drachm contains acid solution of bismuth equivalent to about 5 grains of bismuth sodium tartrate, 1 grain of pepsin, and about ½ minim of liquid extract of nux vomica, with dilute hydrocyanic acid, solution of bordeaux B and double chloroform water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Mistura Bismuthi Composita cum Pepsino, B.P.C.—(Mist. Bism. Co. c. Pepsin.)—Compound Bismuth Mixture with Pepsin. Each fluid drachm contains ½ fluid drachm of concentrated solution of bismuth, 1 grain of pepsin, 7½ minims of tincture of nux vomica and 2 minims of dilute hydrocyanic acid, with chloroform, solution of bordeaux B and distilled water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Mistura Bismuthi Composita cum Pepsino et Morphina, B.P.C.—(Mist. Bism. Co. c. Pepsin. et Morph.)—Compound Bismuth Mixture with Pepsin and Morphine. Each fluid drachm contains $\frac{1}{40}$ grain of morphine hydrochloride in compound bismuth mixture with pepsin. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Pulvis Pepsini Compositus, B.P.C.—(Pulv. Pepsin. Co.)—Compound Pepsin Powder. Pepsin, about 1 in 6, pancreatin, 1 in 10, and diastase, 1 in 100, with lactic acid, hydrochloric acid and lactose. Dose.– 0·6 to 2 grammes (10 to 30 grains).

Vinum Pepsini, B.P.C.—(Vin. Pepsin.)—Pepsin Wine. Each fluid drachm contains 2 grains of pepsin, with hydrochloric acid and glycerin, in sherry-type wine. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

PEPTONUM

(Pepton.)

Peptone

Peptone is a mixture of the cleavage products of proteins consisting largely of proteoses with peptones and amino-acids. It may be prepared by the enzymatic degradation of proteins, such as by the action of pepsin on lean meat or blood fibrin in an acid medium at a temperature of about 37°. The reaction is stopped at an appropriate time, in order to produce a material high in proteoses. The solution is neutralised, filtered, and evaporated *in vacuo*. It occurs as a whitish or buff-coloured powder, with a faint, meat-like odour, and completely, or almost completely, soluble in water. It should be free from more than traces of histamine.

Peptone for use in bacteriological media varies in composition in accordance with the purpose for which it is required; it should be free from reducing sugars. For some purposes peptone containing a higher percentage of amino-acids is preferable. Such peptone may be prepared by the tryptic digestion of proteins.

Action and Uses.—Peptone is used for non-specific desensitisation in allergic conditions such as asthma, migraine, hay fever, prurigo, angioneurotic œdema, urticaria, eczema and epilepsy. It is **administered** intramuscularly or intravenously, or orally in tablets, cachets or capsules, or in mixtures. A 5 per cent. w/v solution is used for intravenous injection, and a 7·5 per cent. w/v solution is used for intramuscular injection, the injections being given in a series of graduated doses increasing from 0·2 to 1·5 millilitres. Solutions of peptone for **injection** may be sterilised by heating in an autoclave at 115° for fifteen minutes, by filtration, or by heating at 100° for one hour on three successive days. Peptone is also used as a constituent of culture media in bacteriology.

Dose.– 0·3 to 1 gramme (5 to 15 grains); 0·01 to 0·1 gramme ($\frac{1}{6}$ to $1\frac{1}{2}$ grains), by injection.

PEPTONUM BOVINUM.—Beef or dietetic peptone may be prepared by the action of pepsin on minced lean beef in an acid medium. The mixture is kept at a temperature not exceeding 50° until 10 millilitres of the filtered solution ceases to give a precipitate on the addition of 15 millilitres of nitric acid. The solution is then filtered, neutralised with sodium bicarbonate and evaporated *in vacuo*. It occurs as a nearly odourless, white or yellowish-brown powder, or in scales. Aqueous solutions are not coagulated by boiling. Beef peptone is administered in pastilles or lozenges containing 5 grains in each, in enemas in doses of 2 to 4 ounces of solution (1 in 8), and in suppositories of 15, 30, or 60 grains containing 75 per cent. of beef peptone.

STERILISED COWS' MILK is injected intramuscularly in doses of 5 to 10 millilitres (75 to 150 minims) for the production of shock in non-specific protein therapy.

Preparations

Injectio Peptoni, B.P.C.—(Inj. Pepton.)—Injection of Peptone. Peptone, 5 or 7·5 per cent. w/v, in neutral, isotonic, aqueous solution. Dose.– 0·2 millilitre (3 minims) gradually increased to 1·5 millilitres (25 minims), by intravenous or intramuscular injection.

Liquor Ferri Peptonatis, B.P.C.—(Liq. Ferr. Pepton.)—Solution of Iron Peptonate. *Syn.*—Solution of Peptonised Iron. It contains the equivalent of about 0·65 per cent. w/v of iron, with peptone, 4 per cent. w/v, and flavouring agents. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Liquor Ferri Peptonatis cum Mangano, B.P.C.—(Liq. Ferr. Pepton. c. Mangan.)—Solution of Iron Peptonate with Manganese. *Syn.*—Solution of Peptonised Iron with Manganese. Each fluid drachm contains about $\frac{1}{8}$ grain of manganese chloride in solution of iron peptonate. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Suppositorium Nutriens, B.P.C.—(Supp. Nutr.)—Nutrient Suppository. *Syn.*—Suppositorium Peptoni; Peptone Suppository. Each suppository contains about 75 per cent. of beef peptone.

PERSIO
(Pers.)

Cudbear

Cudbear is a substance obtained from *Roccella tinctoria* DC., *R. Montagnei* Bél., and other species of *Roccella* (Fam. Roccellaceæ,

Order Ascolichenes), lichens growing chiefly on the Canary Islands, Madagascar and on the African coasts. The lichens are digested with about three times their weight of solution of ammonia at 60° for from three days to a week, air being admitted as considered requisite. The mixture assumes first a blue and subsequently a red colour and the product is dried and ground.

Cudbear occurs as a purplish-red powder which imparts a rich red colour to acid and neutral liquids; the colour is again changed to purplish-red on the addition of alkalis. Little definite is known of the constituents of cudbear; probably the colouring principles belong to the oxazine or oxazone group.

Uses.—Cudbear is employed as a colouring agent, especially in the preparation of syrups having an acid reaction. It imparts a bright red colour to such solutions, which changes to purple when alkalis are added. It may be used in the form of a solution or decoction prepared by boiling the fine powder with distilled water for ten minutes, straining and diluting with water if necessary, or in the form of Tinctura Persionis.

LITMUS is a blue pigment obtained from various lichens, chiefly *Roccella tinctoria* DC., *R. Montagnei* Bél., *Ochrolechia tartarea* Linn. and *Dendrographa leucophæa* Darbish. The coarsely powdered lichen is mixed with pearl ash and ammonium carbonate solution and submitted for a few weeks to a slow process of fermentation, during which a red colouring matter is produced which gradually changes to blue. Chalk and gypsum are then added, the mixture is passed through a sieve, formed into small rectangular cakes and dried. Litmus occurs in dark blue or bluish-violet, finely granular, friable and slightly aromatic, rectangular cakes or irregular pieces about 3 to 10 millimetres in the greatest dimension. Litmus contains several colouring matters, namely, azolitmin, erythrolitmin, erythrolein and spaniolitmin, of which azolitmin and erythrolitmin appear to be the chief, but they are probably not homogeneous substances. The lichens from which litmus is prepared contain lecanoric acid (*R. tinctoria*), erythrin (*R. Montagnei*), and orcin. Lecanoric acid is diorsellinic acid and is converted by alkalis into orsellinic acid; erythrin is erythrityl orsellinate and may be converted into erythritol and orsellinic acid. All these substances are colourless. Orsellinic acid yields, by further change, orcin, from which, by the action of air in the presence of ammonium carbonate, the colouring matters are produced. These appear to be oxidation products of amino-orcinol. Litmus also contains large quantities of chalk and gypsum.

ORCHILLA.—Orchil, or archil, is a colouring matter obtained from the same botanical sources as cudbear; it occurs in three forms, extract (liquid archil), crystals and powder. Archil extract is manufactured by steeping the orchella weed in ammonia solution; the liquor which is then separated has little colour, but by a further addition of ammonia solution and agitation for a lengthy period at a temperature of about 50°, a reddish-purple colour develops as the result of oxidation. The extract is a reddish-purple liquid, having an ammoniacal odour and a specific gravity of from about 1·04 to 1·05. Archil crystals and archil powder are obtained by treating the extract with sulphuric acid, dissolving the precipitate in alkali solution and evaporating to dryness. They are completely soluble in water, producing reddish-purple solutions.

Preparation

Tinctura Persionis, B.P.C.—(Tinct. Pers.)—Tincture of Cudbear. 1 in 8.

PETROLEUM LEVE

(Petrol. Lev.)

Light Petroleum

Synonyms—Petroleum Spirit; Petroleum Ether.

Light petroleum is the refined distillate from the lower boiling fractions of natural petroleum, shale oil, or low-temperature tar, or of the products produced by the hydrogenation of coal or the cracking of oils. It consists chiefly of a mixture of saturated hydro-carbons of the methane series. It is a colourless, highly inflammable liquid, having a characteristic odour. Its vapour forms an explosive mixture with air. Fractions boiling at 40° to 50° and 50° to 60° constitute the light petroleum reagents of the British Pharmacopœia.

Soluble in alcohol (about 1 in 16); readily miscible with fixed oils (except castor oil), volatile oils, chloroform, ether and benzene.

Standard.—Not less than 95 per cent. of light petroleum distils between 40° and 60°, the specific gravity of which is from 0·620 to 0·700. Residue on evaporation, not more than 0·002 per cent. w/v. Shaken with an equal volume of sulphuric acid, no colour or foreign odour is developed (absence of carbonisable matter, aromatic and sulphur compounds). 10 millilitres, dissolved in a mixture of alcohol and ether previously neutralised to phenolphthalein, gives an immediate red colouration on the addition of 1 drop of N/10 alcoholic potassium hydroxide solution (limit of acidity).

Action and Uses.—Light petroleum is not absorbed from the unbroken skin, and only slightly, if at all, from wounds. When inhaled it is rapidly taken up by the lungs and exerts a toxic action on the central nervous system, the symptoms being headache, mental confusion, tremor and weakness of voluntary muscle. Complete narcosis may ensue. When taken by the mouth, it does not exert such a poisonous action in adults, owing to its slow absorption and the prompt vomiting that usually occurs. Children are, however, more susceptible. Light petroleum is a valuable insecticide and is useful for the destruction of skin parasites. It has occasionally been used as a vermifuge in doses of 30 minims given as an emulsion. It is used largely as a solvent. Treatment of acute **poisoning** consists in gastric lavage, the administration of stimulants and the application of warmth. If there is any cyanosis, artificial respiration should be employed.

BENZINE.—Benzine is the name given to that portion of crude petroleum distilling below 150° and having a specific gravity below 0·750. It should be carefully distinguished from benzene, C_6H_6, and from benzol. It is separated by fractional distillation and subsequent refining into various commercial products, such as benzoline or mineral naphtha, boiling-range 70° to 95°, specific gravity about 0·700; ligroin or petroleum naphtha, boiling-range 90° to 120°, specific gravity 0·707 to 0·722; petrol, boiling-range 30° to 150° (or 200°), specific gravity 0·68 to 0·75. Higher fractions of petroleum occur in commerce amongst which are the following: white spirit (turpentine substitute), boiling-range 140° to 220°, specific gravity 0·780 to 0·820; illuminating or solar oils, boiling-ranges 150° to 200° 200° to 250°, 250° to 300°, specific gravity about 0·753 to 0·864; heavy oils for lubrication, boiling-range above 300°, specific gravity up to 0·860.

PHENACETINUM

(Phenacet.)

Phenacetin

$C_{10}H_{13}O_2N = 179{\cdot}1$

Synonym—Acetphenetidin.

Phenacetin is aceto-*p*-phenetidide, $CH_3CO{\cdot}NH{\cdot}C_6H_4{\cdot}OC_2H_5$, and may be prepared by nitrating phenol with slightly diluted nitric acid, or with sulphuric acid and sodium nitrate solution, and distilling the product with steam to remove the *o*-nitrophenol from the less volatile *p*-nitrophenol. The latter is purified and converted, by heating its sodium derivative with ethyl iodide, into *p*-nitrophenetole, which is reduced to *p*-phenetidine; from this, phenacetin is produced by prolonged boiling with glacial acetic acid. Phenacetin occurs in white, glistening, laminar crystals, or as a fine, white, crystalline powder, without odour but with a faintly bitter taste. When phenacetin is boiled with hydrochloric acid, and the solution well diluted with water and filtered, the filtrate gives a violet colour, changing rapidly to ruby-red, on the addition of 1 drop of N/10 potassium dichromate.

Soluble in water (about 1 in 1700), alcohol (90 per cent.) (1 in 21), alcohol (60 per cent.) (1 in 100), ether and chloroform; slightly soluble in glycerin.

Standard, B.P.—Phenacetin has a melting-point of 134° to 136°. Ash, not more than 0·05 per cent. The aqueous solution is neutral to litmus. It complies also with a limit test for readily carbonisable substances, and with tests for absence of acetanilide and *p*-phenetidine.

Action and Uses.—Phenacetin reduces temperature in fever by its action on the heat-regulating mechanism of the central nervous system; its effect is to increase the loss of heat by dilatation of the cutaneous vessels. Phenacetin depresses the nerve centres, especially in the basal ganglia of the brain, producing a diminished sensibility to pain. On this account it is employed largely to relieve headache and rheumatic and neuralgic pains. When the pain is severe phenacetin is of little use. It is usually well tolerated, but large doses may cause sweating; the cyanosis and rash that sometimes follow the administration of acetanilide are rarely observed with phenacetin. Toxic effects due to alteration of the red blood corpuscles and production of methæmoglobin are less often observed with phenacetin than with acetanilide. It is best **administered** in tablets or cachets, or suspended in water with compound powder of tragacanth. It is commonly prescribed with caffeine, which counteracts the tendency to circulatory depression, as in Tabellæ Phenacetini Compositæ, a combination which is useful in migraine. Phenacetin is also given as Phenacetinum Effervescens or as Phenacetinum cum Caffeina Effervescens.

Dose.—0·3 to 0·6 gramme (5 to 10 grains).

PHENOCOLLI HYDROCHLORIDUM. — Phenocoll hydrochloride, $CH_3(NH_2)CO{\cdot}NH{\cdot}C_6H_4{\cdot}OC_2H_5{,}HCl$, aminoaceto-*p*-phenetidide hydrochloride, or phenamine, occurs as white, crystalline needles or cubes, or as a white, microcrystalline powder having a sharp, saline, and slightly bitter taste. It is soluble in water (1 in 16), readily in hot water and alcohol. Phenocoll hydrochloride reduces temperature in fever, its action closely resembling that of phenacetin, but it is more rapid in its effects on account of its greater solubility. It is employed chiefly in rheumatic fever, malaria and epidemic influenza. Phenocoll hydrochloride may be administered in mixtures or in cachets, or as effervescent granules. Dose.– 0·5 to 1 gramme (8 to 15 grains).

Preparations

Phenacetinum cum Caffeina Effervescens, B.P.C.—(Phenacet. c. Caffein. Efferv.)—Effervescent Phenacetin with Caffeine. Phenacetin, about 1 in 20 and caffeine citrate, about 1 in 60. Dose.– 4 to 8 grammes (1 to 2 drachms).

Phenacetinum Effervescens, B.P.C.—(Phenacet. Efferv.)—Effervescent Phenacetin. About 1 in 20. Dose.– 4 to 8 grammes (1 to 2 drachms).

Tabellæ Acidi Acetylsalicylici Compositæ, B.P.C.—(Tab. Acid. Acetylsalicyl. Co.)—Compound Tablets of Acetylsalicylic Acid. *Syn.*—Compound Aspirin Tablets. Each tablet contains 3½ grains of acetylsalicylic acid, 2½ grains of phenacetin and ½ grain of caffeine. Dose.– 1 or 2 tablets.

Tabellæ Acidi Acetylsalicylici et Opii Compositæ, B.P.C.—(Tab. Acid. Acetylsalicyl. et Opii Co.)—Compound Tablets of Acetylsalicylic Acid and Opium. Each tablet contains 3 grains of acetylsalicylic acid, 1½ grains of phenacetin and 1 grain of powder of ipecacuanha and opium. Dose.– 1 to 4 tablets.

Tabellæ Phenacetini Compositæ, B.P.C.—(Tab. Phenacet. Co.)—Compound Phenacetin Tablets. Each tablet contains 4 grains of phenacetin and 1 grain of caffeine. Dose.– 1 or 2 tablets.

Tabellæ Phenacetini et Caffeinæ Citratis, B.P.C.—(Tab. Phenacet. et Caffein. Cit.)—Tablets of Phenacetin and Caffeine Citrate. Each tablet contains 4 grains of phenacetin and 1 grain of caffeine citrate. Dose.– 1 or 2 tablets.

PHENAZONI SALICYLAS

(Phenazon. Salicyl.)

Phenazone Salicylate

$C_{11}H_{12}ON_2{,}C_7H_6O_3 = 326{\cdot}2$

Synonym—Antipyrin Salicylate.

Phenazone salicylate may be prepared by heating on a water-bath a mixture of phenazone and salicylic acid in molecular proportions. The mixture melts, yielding an oily liquid which solidifies on cooling and may be purified by recrystallisation from alcohol. It may also be obtained by shaking an aqueous or chloroform solution of phenazone with an ethereal solution of salicylic acid, when the phenazone salicylate separates slowly in fine crystals. It occurs as colourless, odourless, hexagonal laminæ or as a crystalline powder, having a sweetish, bitter, not disagreeable taste, and an acid reaction. It is decomposed by acids and alkalis.

Heated with dilute sulphuric acid it yields salicylic acid, and with sodium hydroxide solution, phenazone is liberated. Its aqueous solution treated with ferric chloride solution gives the violet colouration characteristic of salicylic acid. The aqueous solution becomes milky on the addition of tannic acid, and on adding a few drops of fuming nitric acid it becomes green.

Soluble in water (1 in 240), boiling water (1 in 25), alcohol (1 in 4), ether, chloroform and benzene; slightly soluble in carbon disulphide.

Standard.—Phenazone salicylate contains not less than 57 per cent. of phenazone and not less than 42 per cent. of salicylic acid. Melting-point, 91° to 92°. Ash, not more than 0·1 per cent.

Assay.—For phenazone. Dissolve 1 gramme in 25 millilitres of water, add 10 millilitres of sodium hydroxide solution, and extract completely with chloroform. The chloroform extract on evaporation to dryness leaves not less than 0·57 gramme of a residue which responds to the identity tests for Phenazonum.

For salicylic acid. Dissolve about 1 gramme, accurately weighed, in 50 millilitres of alcohol (60 per cent.) and titrate with N/10 sodium hydroxide, using phenol red as indicator; each millilitre of N/10 sodium hydroxide is equivalent to 0·01380 gramme of salicylic acid.

Action and Uses.—Phenazone salicylate is decomposed in the duodenum into phenazone and salicylic acid. It is prescribed in acute and chronic rheumatism, in sciatica, and as an antipyretic in influenza. It may be **administered** in cachets, or suspended in water with compound powder of tragacanth. The containers should comply with the tests for limit of alkalinity of glass.

Dose.—0·3 to 1·2 grammes (5 to 20 grains).

PHENAZONI ACETYLSALICYLAS.—Phenazone acetylsalicylate occurs as a white, crystalline powder and is given in doses of 0·5 to 1 gramme (8 to 15 grains) as an antipyretic and antirheumatic.

PHENAZONUM

(Phenazon.)

Phenazone

$C_{11}H_{12}ON_2 = 188·1$

Synonym—Antipyrin.

Phenazone is 1-phenyl-2 : 3-dimethyl-5-pyrazolone, and may be obtained by the condensation of phenylhydrazine with ethyl aceto-acetate, whereby phenylmethylpyrazolone is produced; this is dissolved in methyl alcohol and treated with methyl iodide. It occurs in small, colourless crystals, or as a white, crystalline powder, without

odour but with a slightly bitter taste. It unites directly with acids to form salts, and an acid solution gives a precipitate with potassio-mercuric iodide solution. Chloroform extracts it from alkaline solution but not completely from acid solution. On the addition of solution of tannic acid to an aqueous solution of phenazone, a white precipitate is produced. On the addition of dilute sulphuric acid to a 1 per cent. w/v aqueous solution of phenazone containing a trace of sodium nitrite, a green colouration is produced. On the addition of 1 drop of ferric chloride solution to 2 or 3 millilitres of a 1 in 1000 aqueous solution of phenazone, a deep red colour is produced which changes to light yellow on the addition of dilute sulphuric acid.

Soluble in water (1 in 1·2), alcohol (90 per cent.) (1 in 1·3), chloroform (1 in 1·3) and ether (about 1 in 50).

Standard, B.P.—Phenazone has a melting-point of 111° to 113°. Ash, not more than 0·1 per cent. The 5 per cent. w/v aqueous solution is neutral to litmus.

Action and Uses.—The action of phenazone is similar to that of phenacetin, but, being more soluble in water, phenazone acts more rapidly, although for a shorter time. It is more toxic than phenacetin on account of its more rapid absorption. Phenazone is excreted in the urine unchanged. Its action varies with the dose, and ceases as soon as excretion has taken place. Phenazone is used to reduce temperature in fever; it increases the loss of heat by dilating the cutaneous vessels, and does not diminish the production of heat. It is also a valuable analgesic, diminishing the sensibility to pain, and is employed, often associated with tincture of gelsemium, with great success in neuralgia; it does not seem to act on the cortex of the brain like morphine, but on the basal ganglia. Its antipyretic action is also due to its effect on the basal ganglia (corpus striatum). It is given to children for whooping cough in doses of 0·1 gramme (1½ grains). It sometimes causes rashes and other untoward symptoms, such as nausea, fainting and collapse, although not so commonly as acetanilide. Phenazone is **administered** in powders, tablets, cachets, capsules, effervescent granules, and mixtures. The addition of aromatic spirit of ammonia to mixtures containing phenazone is recommended as a means of obviating any tendency to fainting and collapse. It is **incompatible** with Spiritus Ætheris Nitrosi or other nitrites in acid solution, also with tannic acid in aqueous solution; with sodium salicylate in the dry state it forms an oily liquid on exposure of the mixed solids to air, and it acts similarly with butylchloral hydrate and betanaphthol. In cases of **poisoning** by phenazone, stimulants should be given and the recumbent position maintained; oxygen may be inhaled.

Dose.—0·3 to 0·6 gramme (5 to 10 grains).

PHENAZONI ET CAFFEINÆ CITRAS.—Phenazone and caffeine citrate is a white, crystalline powder, containing 90 per cent. of phenazone, 9 per cent. of caffeine and 1 per cent. of citric acid. It is readily soluble in water (1 in 2), and is used as an analgesic. Dose.—0·5 to 1 gramme (8 to 15 grains).

Preparations

Phenazonum Effervescens, B.P.C.—(Phenazon. Efferv.)—Effervescent Phenazone. *Syn.*—Effervescent Antipyrin. About 1 in 12. Dose.– 4 to 8 grammes (1 to 2 drachms).

Phenazonum cum Caffeina Effervescens, B.P.C.—(Phenazon. c. Caffein. Efferv.)—Effervescent Phenazone with Caffeine. *Syn.*—Effervescent Antipyrin with Caffeine. Phenazone, about 1 in 12, and caffeine citrate, about 1 in 60. Dose.– 4 to 8 grammes (1 to 2 drachms).

PHENOBARBITONUM

(Phenobarbiton.)

Phenobarbitone

$C_{12}H_{12}O_3N_2 = 232{\cdot}1$

Synonym—Phenobarbital.

Phenobarbitone is 5-phenyl-5-ethylbarbituric acid and may be prepared by condensing the ethyl ester of phenylethylmalonic acid with urea. It occurs as a white, odourless, crystalline powder with a slightly bitter taste. It has an acid reaction, and readily dissolves in solutions of alkali hydroxides or carbonates forming solutions of the alkali derivatives. When boiled with concentrated sodium hydroxide solution, or when fused with caustic alkalis, ammonia is evolved. Phenobarbitone may be distinguished from barbitone by adding a trace of sodium nitrite to a 10 per cent. w/v solution in cold sulphuric acid; an orange colouration is produced.

Soluble in water (about 1 in 1000), alcohol (90 per cent.) (1 in 15), ether and chloroform.

Standard, B.P.—Phenobarbitone has a melting-point of 173° to 177°. Ash, not more than 0·05 per cent. It complies also with a test for absence of phenylbarbituric acid and with limit tests for readily-carbonisable substances, and for neutral and basic substances.

Action and Uses.—Phenobarbitone has properties similar to those of barbitone, but its action is intensified owing to the replacement of an ethyl group by a phenyl group. It is a useful hypnotic and sedative in nervous insomnia, and is also employed to relieve migraine. The toxic action of procaine and other local anæsthetics may be reduced by the previous administration of a dose of phenobarbitone. Phenobarbitone is used more especially in the treatment of epilepsy, but care should be exercised as tolerance is apt to be established, necessitating increase in dosage. Serious relapse has often been observed in epileptic patients following the withdrawal of this drug. It should be noted that there is only a small margin between the maximum therapeutic dose and the minimum lethal dose. Phenobarbitone is contra-indicated in arteriosclerosis, pulmonary and cardiac disease and in nephritis. In some

individuals a skin rash may be produced by phenobarbitone, necessitating withdrawal of the drug. **Poisoning** by phenobarbitone should be treated as outlined for Barbitonum.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

Preparations

Elixir Phenobarbitoni, B.P.C.—(Elix. Phenobarbiton.)—Elixir of Phenobarbitone. Each fluid drachm contains about ¼ grain of phenobarbitone with oils of orange, lemon, coriander and anise, glycerin, compound solution of tartrazine, alcohol (90 per cent.) and distilled water. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Tabellæ Phenobarbitoni et Theobrominæ, B.P.C.—(Tab. Phenobarbiton. et Theobrom.)—Tablets of Phenobarbitone and Theobromine. Each tablet contains ½ grain of phenobarbitone and 5 grains of theobromine. Dose.– 1 or 2 tablets.

PHENOBARBITONUM SOLUBILE

(Phenobarbiton. Solub.)

Soluble Phenobarbitone

$C_{12}H_{11}O_3N_2Na = 254·1$

Synonyms—Soluble Phenobarbital; Phenobarbitone-Sodium.

Soluble phenobarbitone is the monosodium derivative of 5-phenyl-5-ethylbarbituric acid, and may be prepared by treating phenobarbitone with sodium hydroxide. It occurs as a white, hygroscopic, odourless powder, with a bitter taste. The aqueous solution is alkaline to litmus, and yields a precipitate of phenobarbitone on the addition of hydrochloric acid; on long standing or prolonged boiling, the aqueous solution may yield a precipitate of phenobarbitone. On ignition, soluble phenobarbitone yields a residue of sodium carbonate. Soluble phenobarbitone may be distinguished from soluble barbitone by its ready solubility in alcohol (90 per cent.). It should be **stored** in well-closed containers.

Soluble in water and alcohol (90 per cent.); insoluble in ether and chloroform.

Standard, B.P.—Soluble phenobarbitone contains not less than 95 per cent. of $C_{12}H_{11}O_3N_2Na$. It complies also with a limit test for free phenobarbitone, neutral and basic substances.

Action and Uses.—Soluble phenobarbitone has properties similar to those of phenobarbitone, but differs in being freely soluble in water. Solutions for injection may be sterilised by tyndallisation or by filtration. It is **incompatible** with ammonium bromide and other ammonium salts. When the two are dispensed together, a white crystalline precipitate of phenobarbitone is deposited, and the supernatant liquid is alkaline and smells of ammonia.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

PHENOL
(Phenol)

Phenol

$C_6H_6O = 94{\cdot}05$

Synonyms—Acidum Carbolicum; Carbolic Acid.

Phenol is hydroxybenzene, C_6H_5OH, and may be obtained synthetically, or from crude tar in which it occurs to the extent of about 0·5 per cent. The coal tar is fractionally distilled, when the phenol passes over in the fraction distilling between about 170° and 230° together with naphthalene and cresols. The phenol is obtained from the separated aqueous layer after treatment with 20 per cent. sodium hydroxide solution by the addition of acid, and purified.

Phenol occurs in colourless, acicular, deliquescent crystals, or in crystalline masses, which may sometimes become pinkish in colour on keeping. It has a characteristic "carbolic" but not tarry odour, and a sweetish, pungent taste. It has a freezing-point of about 40°, and a boiling-point of about 182°. The "detached crystals" of commerce melt at 39° to 40°, but the "ice crystals" are less pure and have a slightly lower melting-point. On the addition of one or two drops of ferric chloride solution to an aqueous solution, a violet colour is produced; the colour is not produced in alcoholic solution. Solutions of phenol give, on the addition of bromine water, a white precipitate which at first redissolves, but is permanent in the presence of excess of bromine water. At 15°, 100 parts of phenol are liquefied by the addition of 10 parts of water and will dissolve 30 to 40 parts of water, but on the further addition of water the liquid separates into two layers, the one a solution of phenol in water, the other a solution of water in phenol, until 1300 parts of water have been added, when a clear solution of phenol in water is formed. It is readily soluble in alkalis, forming solutions of the alkali phenates. Phenol should be **stored** in well-closed containers in a cool place and protected from light.

Soluble in water (1 in 13), alcohol (90 per cent.) (6 in 1), ether (5 in 1), chloroform (2 in 1), glycerin (3 in 1), liquid paraffin (about 1 in 200) and in fixed and volatile oils.

Standard, B.P.—Phenol contains not less than 98 per cent. of C_6H_6O. The 1 in 13 aqueous solution at 15·5° is clear and not more than faintly acid to litmus. Residue on volatilisation on a water-bath, not more than 0·05 per cent.

Action and Uses.—Phenol exerts an antiseptic action which varies not only with its concentration, but with the solvent, the proportion of salts present, and the temperature at which it is used. A 1 per cent. aqueous solution destroys the virulence of septic and putrefactive bacteria and of the tubercle bacillus in a few minutes, but more concentrated solutions are required to destroy resistant spores. Solutions in alcohol or oil are practically without antiseptic action, since its affinity

for the solvent is much greater than for the bacterium, and the germicidal power of phenol in watery solutions diminishes as alcohol is added. Phenol is rapidly absorbed from the alimentary canal or from wounds, and in the tissues it combines with sulphuric acid and is excreted as phenylsulphuric acid. In small doses it is sometimes given for gastric fermentation and, in conjunction with bismuth carbonate, for fermentative diarrhœa; for the former purpose, however, sodium phenolsulphonate and for the latter salol are generally preferred.

Phenol is used **externally** both for antiseptic purposes and for its action as a local anæsthetic in allaying pruritus. It is used for disinfecting instruments, utensils, etc., and for the treatment of wounds. Applied to the skin as a 5 per cent. w/v solution, or stronger, it produces a sensation of burning, followed by numbness, and the skin appears white and opaque from the precipitation of the superficial proteins. The presence of glycerin retards the local action considerably. The strong liquefied substance is applied to acne spots, and is occasionally injected into boils and carbuncles at an early stage. Solutions of phenol should not be applied as dressings to the fingers or toes since gangrene may result. For burns and scalds, a solution of 1 part of crystallised phenol in 20 or 40 parts of olive oil is frequently used. A combination of phenol with camphor is not caustic, does not harm the tissues, and has been employed as a paint to the cervix uteri. As a local anæsthetic in toothache, solid phenol, Collodium Carbolisatum, or Phenol cum Camphora is applied. An aqueous solution is used as a gargle, mouth-wash (preferably in the form of solution of sodium phenate), inhalation (1 in 400 to 500 of water at 60°), or spray (1 in 150 of water). Aqueous solutions of phenol should be coloured with magenta or other suitable red dye, unless otherwise directed. Glycerinum Phenolis is used with an equal quantity of glycerin or glycerin of tannic acid as a paint for inflammatory conditions of the mucous membrane of the mouth and throat; the glycerin limits and prolongs the action of the phenol and weakens its caustic effect. If it is necessary to dilute Glycerinum Phenolis for ear-drops, it should be diluted with glycerin, since dilution with water renders it caustic. Oleum Lubricans is used for lubricating catheters which should previously have been sterilised in aqueous solution of phenol (1 in 20). Phenol Iodisatum is occasionally used as a local application. A 10 to 20 per cent. solution of phenol in equal parts of glycerin and water has been used for the treatment of internal hæmorrhoids by direct injection into the pile mass; a 5 per cent. solution in almond oil has been used for a similar purpose by infiltration into the surrounding mucous membrane.

For internal use, phenol may be **administered** in pills massed with one and a half times its weight of powdered liquorice, half its weight of compound powder of tragacanth, and sufficient syrup of liquid glucose added gradually in very small quantities. It may also be given in the form of mixture (either alone or in combination with sodium bicarbonate or spirit of chloroform) or as a pastille or lozenge (0·03 gramme, ½ grain). It is **incompatible** with salts of iron, and cannot be made

into pills with camphor, thymol, menthol, resins and gum-resins without the use of much absorbent powder. In cases of **poisoning** by phenol, saccharated solution of lime, solution of iodine, caffeine, olive oil or camphorated oil should be administered; the usual amount of camphorated oil is two teaspoonfuls, although larger quantities have sometimes been given. Warmth should be applied to the extremities, and alcoholic stimulants given per rectum or hypodermically. In chronic poisoning, when the phenol has fixed all the available sulphates so that the urine contains only aromatic sulphates, which are not precipitated by barium chloride, sodium sulphate, well diluted, should be injected under the skin. Phenol burns are best treated by the immediate application of glycerin, but olive oil and lime water are also useful.

Dose.—0·06 to 0·2 gramme (1 to 3 grains).

CYCLOHEXANOLUM.—Cyclohexanol, $C_6H_{11}OH$, may be obtained by the catalytic hydrogenation of phenol and occurs as a somewhat toxic, oily liquid, having a persistent, camphoraceous odour. It has a specific gravity of about 0·935 to 0·945 and a boiling-range of 155° to 170°. It is miscible with hydrocarbons and is used as a solvent in the manufacture of lacquers and varnishes.

CYCLOHEXANONUM.—Cyclohexanone, $C_6H_{10}O$, may be obtained by the catalytic hydrogenation of phenol and occurs as a colourless oil, having an odour recalling that of peppermint and acetone. It has a specific gravity of about 0·93 to 0·96 and a boiling-range of 150° to 165°. It is miscible with most organic solvents and is used as a solvent in the manufacture of lacquers and varnishes.

CYCLOHEXANYLIS ACETAS.—Cyclohexanyl acetate, $CH_3{\cdot}COOC_6H_{11}$, is obtained by the acetylation of cyclohexanol. The pure substance is a solid, but owing to incomplete esterification it occurs in commerce as an oily liquid, having a strong, fruity odour, a specific gravity of about 0·947 to 0·980 and a boiling range of 170° to 180°. It is used as a solvent in the manufacture of lacquers and varnishes.

DIAMINOPHENOLIS HYDROCHLORIDUM.— Diaminophenol hydrochloride, or amidol, $C_6H_3(NH_2)_2OH,2HCl$, is prepared by the reduction of 2:4-dinitrophenol by means of tin and hydrochloric acid, and combination of the resulting diaminophenol with hydrochloric acid. It occurs as a greyish-white, crystalline powder, readily soluble in water and slightly soluble in alcohol. It gives a yellow colour with ammonia and has been recommended as a substitute for Nessler's reagent. It is used as a photographic developer. Solutions of diaminophenol hydrochloride do not keep well and should be made as required.

TRIPHENYLIS PHOSPHAS.—Triphenyl phosphate, $(C_6H_5O)_3PO$, occurs as a white, crystalline solid melting at about 45° to 48°. It is used as a plasticiser in the manufacture of lacquers and varnishes.

Preparations

Carbasus Phenolis, B.P.C.—(Carbas. Phenol.)—Phenol Gauze. *Syn.*—Carbolic Gauze. It contains from 1 to 3 per cent. of phenol when freshly prepared.

Collodium Carbolisatum, B.P.C.—(Collod. Carbol.)—Carbolised Collodion. A jelly consisting of equal weights of phenol and simple collodion.

Gargarisma Phenolis, B.P.C.—(Garg. Phenol.)—Phenol Gargle. *Syn.*—Gargarisma Acidi Carbolici. Glycerin of phenol, 1 in 20, with distilled water.

Glycerinum Phenolis, B.P.—(Glycer. Phenol.)—Glycerin of Phenol. *Syn.*—Glycerinum Acidi Carbolici. Phenol, 16 per cent. w/w, dissolved in glycerin. *Caution.*—Dilution with water renders it caustic; it may be diluted with glycerin. Dose.—0·3 to 1 millilitre (5 to 15 minims).

Liquor Phenolis Alkalinus, B.P.C.—(Liq. Phenol. Alk.)—Alkaline Solution of Phenol. *Syn.*—Solution of Sodium Phenate. Phenol, 10 per cent. w/v, with sodium hydroxide and distilled water. It is used diluted with 20 to 30 parts of water.

Liquor Potassii Phenatis Compositus, B.P.C.—(Liq. Pot. Phenat. Co.)—Compound Solution of Potassium Phenate. *Syn.*—Liquor Potassii Carbolatis Compositus; Compound Solution of Potassium Carbolate. Liquefied phenol, 5 per cent. v/v, with solution of potassium hydroxide, Cologne spirit, saccharin, tincture of quillaia, emulsion of chloroform, solution of bordeaux B and triple rose water.

Liquor Sodii Phenatis Compositus, B.P.C.—(Liq. Sod. Phenat. Co.)—Compound Solution of Sodium Phenate. *Syn.*—Compound Solution of Sodium Carbolate; Phenol Soda. Phenol, about 3 per cent. w/v, with sodium hydroxide, triple orange-flower water, triple rose water, glycerin, solution of bordeaux B and distilled water.

Lotio Phenolis, B.P.C.—(Lot. Phenol.)—Phenol Lotion. *Syn.*—Lotio Acidi Carbolici; Carbolic Acid Lotion. Phenol, 1 in 80, in distilled water, coloured with solution of bordeaux B.

Solutio phenoli I.A. contains 2 per cent. of phenol.

Nebula Iodi Composita, B.P.C.—(Neb. Iod. Co.)—Compound Iodine Spray. Iodine, 1 per cent. w/v, and phenol, 0·5 per cent. w/v, in light liquid paraffin.

Oleum Carbolisatum, B.P.C.—(Ol. Carbol.)—Carbolised Oil. *Syn.*—Carbolic Oil. Phenol, 5 per cent. w/v, in arachis oil.

Oleum Lubricans, B.P.C.—(Ol. Lubric.)—Lubricant Oil. *Syn.*—Lund's Oil; Catheter Oil. Phenol, 5 per cent. w/v, in castor oil and arachis oil.

Phenol cum Camphora, B.P.C.—(Phenol c. Camph.)—Phenol with Camphor. *Syn.*—Phenol Camphor; Carbolic Camphor. Phenol, 25 per cent. w/w, with camphor.

Phenol Iodisatum, B.P.C.—(Phenol Iodisat.)—Iodised Phenol. *Syn.*—Iodised Carbolic Acid. Iodine, 10 per cent. w/v, in liquefied phenol.

Phenol Liquefactum, B.P.—(Phenol Liq.)—Liquefied Phenol. *Syn.*—Acidum Carbolicum Liquefactum. Phenol, 80 per cent. w/w, with water (limits, 78·5 to 81·5). Specific gravity, about 1·063. Boiling-point, gradually rising to a temperature not higher than 183°. When phenol is to be mixed with collodion, fixed oils, or paraffins, melted phenol should be used, not liquefied phenol. It should be stored in well-closed containers and protected from light. Dose.–0·06 to 0·2 millilitre (1 to 3 minims).

Pigmentum Chloralis et Camphoræ Compositum, B.P.C.—(Pig. Chloral. et Camph. Co.)—Compound Chloral and Camphor Paint. Equal weights of chloral hydrate, camphor and phenol.

Stupa Phenolis, B.P.C.—(Stup. Phenol.)—Phenol Tow. *Syn.*—Carbolised Tow. It contains about 5 per cent. of phenol when freshly prepared.

Suppositorium Phenolis, B.P.—(Supp. Phenol.)—Phenol Suppository. *Syn.*—Suppositorium Acidi Carbolici. Each suppository contains 0·06 gramme (1 grain) of phenol.

Trochiscus Phenolis, B.P.—(Troch. Phenol.)—Lozenge of Phenol. *Syn.*—Trochiscus Acidi Carbolici; Phenol Lozenge; Carbolic Acid Lozenge. Each lozenge contains approximately 0·03 gramme (½ grain) of phenol in a basis coloured with carmine. These lozenges should be stored in well-closed containers in a cool place and protected from light.

Unguentum Phenolis, B.P.—(Ung. Phenol.)—Ointment of Phenol. *Syn.*—Unguentum Acidi Carbolici; Phenol Ointment. Phenol, 3 per cent., in a mixture of white beeswax, lard and hard and soft paraffins.

Unguentum Phenolis Compositum, B.P.C.—(Ung. Phenol. Co.)—Compound Phenol Ointment. *Syn.*—Unguentum Acidi Carbolici Compositum; Compound Carbolic Acid Ointment. Phenol, about 18 per cent., with sulphur, olive oil, yellow beeswax and strong ointment of mercuric nitrate.

Vapor Phenolis Compositus, B.P.C.—(Vap. Phenol. Co.)—Compound Phenol Inhalation. *Syn.*—Vapor Acidi Carbolici Compositus; Compound Carbolic Acid Inhalation. Creosote, 1 per cent. v/v, and oils of eucalyptus and Siberian fir, of each 2 per cent. v/v, in phenol.

PHENOLPHTHALEINUM
(Phenolphthal.)

Phenolphthalein

$C_{20}H_{14}O_4 = 318{\cdot}1$

Phenolphthalein is *pp'*-dihydroxydiphenylphthalide, and may be prepared by heating phenol and phthalic anhydride with sulphuric acid or other condensing agent at a temperature of about 120° for several hours, exhausting the product with boiling water, dissolving the residue in dilute sodium hydroxide solution, filtering and precipitating with acetic acid. The product is decolourised in alcoholic solution by charcoal and precipitated with water, when the precipitated phenolphthalein becomes crystalline on standing. Phenolphthalein occurs as a white or yellowish-white, odourless, tasteless, crystalline or amorphous powder. It may melt at temperatures slightly above 260°. It dissolves in dilute solutions of alkali hydroxides and in solutions of alkali carbonates, giving a red solution which is rendered colourless by the addition of acids. In concentrated sulphuric acid it dissolves, forming a red solution the colour of which disappears on dilution. A red colouration is also given with solution of ammonia, but fades on standing.

Soluble in alcohol (90 per cent.) (1 in 10) and ether; almost insoluble in water.

Standard, B.P.—Phenolphthalein has a melting-point of 254° to 258°. Sulphated ash, not more than 0·05 per cent. Arsenic limit, 2 parts per million. It complies also with a limit test for fluorane.

Action and Uses.—Phenolphthalein is given internally as a purgative. Its action is exerted directly on the intestinal mucous membrane, causing a copious watery secretion. It produces loose motions in from four to six hours, but since some of the drug may be absorbed and is excreted in the bile, purgative effects may continue for several days. Usually, however, it is not absorbed in amounts sufficient to irritate the kidneys or intestines, but cases are on record where the drug appeared to have been absorbed, and backache, albuminuria, and the presence of free hæmoglobin in the urine resulted. It occasionally gives rise to a skin rash. It is especially suitable for delicate persons and for women during pregnancy. It is eliminated chiefly *per rectum*, but some may be eliminated by the kidneys, imparting a red colour to alkaline urine. Phenolphthalein is **administered** in cachets, lozenges, or

tablets, either alone or with aloin and other purgatives, or diffused in liquid paraffin. It is also given with emulsions of liquid paraffin and agar.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

Preparations

Emulsio Paraffini Liquidi Composita, B.P.C.—(Emuls. Paraff. Liq. Co.)—Compound Emulsion of Liquid Paraffin. *Syn.*—Emulsion of Liquid Paraffin with Agar and Phenolphthalein. Emulsion of liquid paraffin with agar, containing $1\frac{1}{2}$ grains of phenolphthalein in each fluid ounce. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Pilulæ Phenolphthaleini Compositæ, B.P.C.—(Pil. Phenolphthal. Co.)—Compound Phenolphthalein Pills. *Syn.*—Pilulæ Phenaloini. Each pill contains $\frac{1}{4}$ grain of aloin, $\frac{1}{2}$ grain of phenolphthalein, $\frac{1}{60}$ grain of strychnine, $1\frac{1}{2}$ grain of dry extract of belladonna and $\frac{1}{10}$ grain of powdered ipecacuanha. Dose.– 1 or 2 pills.

Tabellæ Phenolphthaleini Compositæ, B.P.C.—(Tab. Phenolphthal. Co.)—Compound Phenolphthalein Tablets. Each tablet contains 1 grain of phenolphthalein, $\frac{1}{100}$ grain of dry extract of belladonna, and $\frac{1}{300}$ grain of strychnine sulphate. Dose.– 1 to 3 tablets.

PHENOL-RUBRUM

(Phenol-Rub.)

Phenol Red

$C_{19}H_{14}O_5S = 354·2$

Synonyms—Phenolsulphonphthaleinum; Phenolsulphonphthalein.

Phenol red may be prepared by fusing *o*-sulphobenzoic acid with phenol at about 130° until combination is complete. This condensation is accompanied by the formation of by-products, and hence manufacturers usually adopt some form of colour standard in order to obtain uniformity. It occurs as a bright to dark red crystalline powder. It dissolves in solutions of alkali hydroxides or carbonates (including ammonium) with the formation of violet-red to deep red solutions as the concentration increases; the colour of these solutions is changed to orange or yellow by a slight excess of acid, and destroyed by warming with zinc dust. 1 millilitre of a 0·1 per cent. alcoholic solution in 100 millilitres of boiled and cooled distilled water produces a strong red colour when shaken with 0·5 millilitre of N/50 sodium hydroxide.

Soluble in water (about 1 in 1300), alcohol (95 per cent.) (about 1 in 350) and acetone (about 1 in 500); almost insoluble in chloroform and ether.

Standard.—Phenol red loses, on drying at 110°, not more than 1 per cent. of its weight. Sulphated ash, not more than 0·2 per cent. Arsenic limit, 5 parts per million.

Uses.—Phenol red is used as an indicator in the determination of the hydrogen ion concentration of urine, starch and bacteriological culture media. Its excretion after the intravenous injection of 0·006 gramme in 1 millilitre is used as a test of renal function. Not less than 50 per cent. for the first hour, or 75 per cent. for the first and second hours, should be excreted in the urine. It can be detected in the urine and determined colorimetrically by making alkaline with sodium hydroxide solution. Combined with ureteric catheterisation, this test can be applied to each kidney separately. Solutions of phenol red for **injection** may be sterilised by heating in an autoclave or by tyndallisation.

PHOSPHORUS

(Phosphor.)

Phosphorus

$P = 31·02$

Phosphorus is a solid, non-metallic element, and may be obtained from bone ash or other sources of calcium phosphate by conversion into metaphosphoric acid and subsequent distillation with carbon, or by heating a mixture of calcium phosphate, sand and coke in an electric furnace. It may be purified by treatment with chromic acid and redistillation. It occurs in commerce in the form of cylindrical sticks, which are translucent, colourless or pale yellow, wax-like, brittle at low temperatures but soft and pliable at ordinary temperatures. Specific gravity, about 1·83; melting-point, about 44°; boiling-point, about 287°. Phosphorus oxidises spontaneously in moist air and ignites at a temperature above its melting-point; it volatilises slowly in steam, the vapour being luminous in the dark. It unites directly with oxygen, sulphur, chlorine, iodine, bromine and many metals.

Heated in an inert atmosphere to about 250°, phosphorus is converted into red phosphorus, which is probably a solid solution of white phosphorus in "metallic" or "black" phosphorus. Red phosphorus consists of an apparently amorphous, bright reddish-brown powder without odour, of specific gravity about 2·19; it is not luminous in the dark and does not oxidise spontaneously in moist air. It is not ignited by friction or by heating to temperatures below 200°, and is insoluble in carbon disulphide. It sublimes at about 290°, producing a vapour which condenses into white phosphorus. Six allotropic modifications of phosphorus exist. Phosphorus should be **stored** under water in closed containers and protected from light.

Insoluble in water; soluble in alcohol (90 per cent.) (1 in 350), chloroform (1 in 25), ether (1 in 80), carbon disulphide (2 in 1) and olive oil (1 in 80).

Action and Uses.—Phosphorus in the elemental state is rarely used in medicine. In the treatment of rickets and other bone diseases, it

has been replaced by the inorganic phosphates. It has been used in the treatment of neurasthenia. Phosphorus is absorbed by the intestines and, in the form of vapour, by the lungs. The presence of oils facilitates its intestinal absorption. Owing to its physical characteristics, red phosphorus is practically non-toxic. Oxidation of phosphorus in the body is very slow, and a portion may be excreted unchanged by the bowel and kidneys. It has a generally depressant action on metabolism and a special power of causing degenerative changes in the liver and kidneys.

Phosphorus may be **administered** as Oleum Phosphoratum, which may be dispensed readily by mixing it with ten times its volume of almond oil and emulsifying with acacia in the usual way. The oil may also be enclosed in capsules or given with cod-liver oil. Liquor Phosphori Compositus is also employed for the administration of phosphorus in liquid form. For administration in pills, Sevum Phosphoratum is commonly employed. This preparation may be readily incorporated with extracts, etc., by the addition of compound powder of tragacanth, or powdered soap and liquorice, care being taken to avoid oxidation as far as possible by adding chloroform or carbon disulphide to the mass, a few drops at a time, and mixing with a minimum of friction. Phosphorus pills should be freshly prepared, well varnished, and enclosed in a dark amber-coloured bottle. Phosphorus should not be handled, and must be dispensed with the utmost care. It should be cut under water, and must always be dissolved for dispensing purposes, whether it is to be administered in liquid form or in pills, since solid particles of free phosphorus give rise to acute gastritis.

The symptoms of phosphorus **poisoning,** owing to slow absorption, may be delayed. Abdominal pain and vomiting are usual. Depression and weakness occur, followed, after an interval which may be days or weeks, by jaundice; severe hæmorrhage from all the mucous membranes is sometimes a feature. The course of a fatal case is very similar to that in acute yellow atrophy of the liver. Chronic poisoning usually manifests itself by ulceration of the gums with periostitis of the upper and lower jaws, followed by necrosis, and invasion by the tubercle bacillus. This condition is found in persons subjected to the action of the vapour, the presence of dental sepsis being a predisposing factor. The treatment of acute poisoning is by copper sulphate used as an emetic, followed by stomach lavage with 0·2 per cent. w/v solution of potassium permanganate. Fats and oils should be avoided, but liquid paraffin is said to delay absorption if taken early. Alkalis should be given freely.

Dose.– 0·0006 to 0·0025 gramme ($\frac{1}{100}$ to $\frac{1}{45}$ grain).

Preparations

Liquor Phosphori Compositus, B.P.C.—(Liq. Phosphor. Co.)—Compound Solution of Phosphorus. *Syn.*—Tinctura Phosphori Composita; Compound Tincture of Phosphorus. Phosphorus, 0·2 per cent. w/v, with chloroform and dehydrated alcohol. Dose.– 0·2 to 0·8 millilitre (3 to 12 minims).

Oleum Phosphoratum, B.P.C.—(Ol. Phosphor.)—Phosphorated Oil. Phosphorus, 1 per cent. w/w, with oil of lemon, in almond oil. Dose.– 0·06 to 0·3 millilitre (1 to 5 minims).

This oil was included in the British Pharmacopœia, 1914.

Pilulæ Damianæ Compositæ, B.P.C.—(Pil. Damian. Co.)—Compound Damiana Pills. Each pill contains 2 grains of extract of damiana and $\frac{1}{10}$ grain each of dry extract of nux vomica and phosphorated suet. Dose.– 1 pill.

Pilulæ Phosphori, B.P.C.—(Pil. Phosphor.)—Phosphorus Pills. Each pill contains $\frac{1}{100}$ grain of phosphorus. Dose.– 1 to 4 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914, *under the name of Pilula Phosphori.*

Sevum Phosphoratum, B.P.C.—(Sev. Phosphor.)—Phosphorated Suet. Phosphorus, 10 per cent., in suet. Dose.– 0·006 to 0·03 gramme ($\frac{1}{10}$ to $\frac{1}{2}$ grain.)

PHYSOSTIGMA
(Physostig.)

Calabar Bean

Synonym—Ordeal Beans.

Calabar bean consists of the ripe seeds of *Physostigma venenosum* Balf. (Fam. Leguminosæ), a woody climbing plant indigenous to the West Coast of Africa.

The seeds are oblong-reniform in shape, being nearly flat or slightly convex on one margin, but boldly arched on the other. They are dark chocolate-brown in colour, and measure about 25 millimetres long, 18 millimetres broad, and 12 millimetres thick. The hilum occurs as a broad, deep groove, extending nearly the entire length of the curved margin, and passing completely round one end of the seed. The lips of the groove are thickened and paler in colour than the channel, which is black, with a distinct, fine brown furrow in the middle; in it may frequently be found portions of a white, papery funiculus and, at one end, the micropyle appears as a minute perforation. The hard seed coat is somewhat rough, and encloses two firm, white, starchy cotyledons, which are curved so as to enclose between them a large cavity, the air in which causes the seeds to float upon water. The seeds have no characteristic odour or taste.

Calabar bean **contains** physostigmine (eserine). Other alkaloids present in small quantity are eseridine, eseramine, physovenine and geneserine. Eseramine is almost without physiological activity, while physovenine, like physostigmine, is a very powerful miotic. Geneserine has a milder action than physostigmine and is said to be identical with eseridine. The total alkaloid varies from about 0·05 to 0·3 per cent. The seeds also contain the phytosterol, stigmasterol, and an abundance of starch, and yield about 4 per cent. of ash.

Substitutes.—The seeds of *P. cylindrospermum* Holmes, which are nearly cylindrical and have a shorter hilum, of *Mucuna urens* Medic. (horse-eye beans), which are brownish and rounded, of *Entada scandens* Benth. (Garbee beans), which are flattened and discoid, and of *Pentaclethra macrophylla* Benth., which are mussel-shaped, are sometimes met with as substitutes for calabar bean.

Action and Uses.—The properties of calabar bean are virtually those of the alkaloid, physostigmine, and it is used only as the source of this alkaloid and its salts. In cases of **poisoning,** the procedure described under Physostigminæ Salicylas should be followed.

PHYSOSTIGMINÆ SALICYLAS

(Physostig. Salicyl.)

Physostigmine Salicylate

$C_{15}H_{21}O_2N_3,C_7H_6O_3 = 413{\cdot}2$

Synonym—Eserine Salicylate.

Physostigmine salicylate, $C_{15}H_{21}O_2N_3,C_6H_4(OH)\cdot COOH$, is the salicylate of an alkaloid, physostigmine, obtained from calabar bean. It may be prepared by neutralising a warm, ethereal solution of physostigmine with an ethereal solution of salicylic acid, which is added until a drop of the liquid produces a faint reddening on moistened blue litmus paper. After the crystals have separated they are collected and dried by gentle heat. Physostigmine salicylate occurs as colourless or faintly yellow, odourless crystals, having a faintly bitter taste and melting, after drying at 100°, at 185° to 187°. The 1 per cent. w/v aqueous solution is neutral to methyl red, but a concentrated alcoholic solution is slightly acid to litmus. Both the salt and its aqueous solution acquire a pink colouration on exposure to air and light, owing to formation of rubreserine; the change is less rapid in faintly acid solutions. The aqueous solution gives with ferric chloride a violet colouration, due to the salicylic acid. In other respects the salt responds to the identity tests given under Physostigminæ Sulphas. It is more stable than the other salts of the alkaloid, but is only sparingly soluble in water. It should be **stored** in well-closed containers and protected from light.

Soluble in water (about 1 in 100) and alcohol (90 per cent.) (about 1 in 12).

Standard, B.P.—Physostigmine salicylate loses, on drying at 100°, not more than 1 per cent. of its weight. Ash, not more than 0·1 per cent. It complies also with a limit test for readily carbonisable substances.

Action and Uses.—The action of physostigmine on involuntary muscle and on secretory glands closely resembles that of pilocarpine. When applied to the eye, it causes great contraction of the pupil; the effect is local, and is due mainly to stimulation of the terminations of the

third nerve; intra-ocular pressure is largely reduced as a result of the contraction. Other plain muscle is affected by physostigmine in much the same way; gastric movements are increased and vomiting may result, and intestinal peristalsis is exaggerated, with production of liquid motions; the movements of the bladder and uterus are augmented, and the bronchioles are constricted. All these effects are antagonised by atropine. A similar stimulation of the peripheral nerve endings in glands results in an increase of their secretions, especially in the case of the sudoriferous, salivary, mucous and lachrymal glands. The action of physostigmine on the circulation is to decrease the pulse rate and raise the blood pressure. It depresses the central nervous system, causing muscular weakness and diminished reflexes. Very large doses excite motor nerve endings and so cause irregular twitchings.

Physostigmine has been employed **internally** for its depressant action on the central nervous system in epilepsy, chorea, etc., but has not proved of much service. It has been given hypodermically, 0·0006 gramme ($\frac{1}{100}$ grain) every four hours, in tetanus, and in intestinal obstruction to obtain an action of the bowels or to prevent the formation of adhesions after operation by exciting peristalsis. In veterinary practice it is given by hypodermic injection for its purgative action. The chief use of physostigmine is as a miotic; under its influence, the pupil commences to contract in from five to fifteen minutes, reaches the maximum contraction in thirty minutes and remains contracted for more than twelve hours. The muscles regulating accommodation are also affected, but they regain their normal condition in from three to four hours. Physostigmine is employed to correct the dilatation caused by atropine, homatropine, or cocaine. It is used in glaucoma to decrease the intra-ocular pressure, but whether this is brought about by lessening the secretion of fluid or by facilitating its escape is not yet clear. For ophthalmic use, Guttæ Physostigminæ, Oculentum Physostigminæ and Lamella Physostigminæ are employed. Solutions of physostigmine salicylate for **injection** may be sterilised by tyndallisation or by filtration. Solutions should be freshly prepared and protected from light. The containers should comply with the tests for limit of alkalinity of glass. Solutions rapidly become pink in colour; this may be avoided to a great extent by dissolving the salt in a solution of boric acid (3 per cent.). Although it is advisable to avoid discolouration, solutions which have become coloured appear to retain their miotic properties. For internal use it may be **administered** in pills. In cases of **poisoning** by physostigmine or its salts, the stomach should be washed out with 0·2 per cent. w/v solution of potassium permanganate, and atropine and strychnine administered hypodermically.

Dose.– 0·0006 to 0·0012 gramme ($\frac{1}{100}$ to $\frac{1}{50}$ grain).

Preparations

Guttæ Physostigminæ, B.P.C.—(Gutt. Physostig.)—Physostigmine Eye Drops. *Syn.*—Guttæ Eserinæ; Eserine Eye Drops. Physostigmine salicylate, 1 per cent., with boric acid, in sterilised water.

Lamella Physostigminæ, B.P.—(Lamell. Physostig.)—Lamella of Physostigmine. *Syn.*—Lamella of Eserine. Each lamella contains 0 000065 gramme ($\frac{1}{1000}$ grain) of physostigmine salicylate.

Oculentum Physostigminæ, B.P.—(Oculent. Physostig.)—Physostigmine Ointment for the Eye. *Syn.*—Oculentum Eserinæ. Physostigmine salicylate, 0·125 per cent., in simple eye ointment. It should be stored in small, well-closed containers in a cool place and protected from light.

An ointment for the eye, prepared with 0·2 per cent. of physostigmine in white soft paraffin, was included in the British Pharmaceutical Codex, 1923.

PHYSOSTIGMINÆ SULPHAS

(Physostig. Sulph.)

Physostigmine Sulphate

$(C_{15}H_{21}O_2N_3)_2,H_2SO_4 = 648{\cdot}5$

Synonym—Eserine Sulphate.

Physostigmine sulphate is the sulphate of the alkaloid, physostigmine, obtained from calabar bean, and may be prepared by adding sulphuric acid (10 per cent.), drop by drop, to a solution of physostigmine in ether until separation of the crystalline sulphate ceases. The salt is collected, and carefully dried at a temperature of about 40°.

Physostigmine sulphate occurs as a yellowish-white, microcrystalline, very deliquescent, odourless powder, having a bitter taste; it gradually becomes reddened on exposure to air and light, owing to formation of rubreserine, a product of oxidation, which is insoluble in ether, but soluble in chloroform and in carbon disulphide. The aqueous solution, which is colourless at first, becomes pink on keeping, and is neutral or only very faintly acid to litmus. After drying at 100°, it melts at about 145°. With gold chloride it produces a purple colour. With sulphuric acid alone the salt gives only a faint yellow colour, but with sulphuric acid containing a crystal of potassium iodate a light purple colour is produced, changing at once to yellowish-red. A 1 per cent. aqueous solution yields with dilute solution of sodium hydroxide a white precipitate becoming pink; the precipitate dissolves in an excess of the reagent to form a red solution. A few milligrams, treated with several drops of ammonia solution, produces a yellowish-red colouration on warming, and on evaporation leaves a bluish residue which dissolves in alcohol to form a blue solution; if acetic acid is then added, the solution appears blue by transmitted light, but shows a red fluorescence which is intensified on dilution with water. The residue left on evaporation of the ammoniacal solution dissolves in sulphuric acid forming a green solution; on the gradual addition of alcohol the colour changes to red, but reverts to green on evaporation of the alcohol. Physostigmine sulphate should be **stored** in well-closed containers and protected from light.

Soluble in water (4 in 1) and alcohol (2·5 in 1); soluble in chloroform, but not very soluble in ether.

Standard.—Physostigmine sulphate loses, on drying at 100°, not more than 1 per cent. of its weight. Ash, not more than 0·1 per cent. 0·05 gramme, dissolved in 1 millilitre of sulphuric acid, does not acquire more than a faintly yellow colouration (limit of readily carbonisable substances). 0·05 gramme in 2 millilitres of water does not produce a violet colouration on the addition of a drop of ferric chloride solution (limit of salicylic acid).

Action and Uses.—The action of physostigmine and its salts is described under Physostigminæ Salicylas. The sulphate is used in the preparation of eye drops, but its solutions are more liable to change colour on storage and, owing to its deliquescent nature, it is more difficult to handle than the salicylate. Solutions of physostigmine sulphate for **injection** may be sterilised by tyndallisation or by filtration. Solutions should be freshly prepared and protected from light. The containers should comply with the tests for limit of alkalinity of glass. The colouration of the solution can be delayed by the addition of 3 per cent. of boric acid.

Dose.– 0·0006 to 0·0012 gramme ($\frac{1}{100}$ to $\frac{1}{80}$ grain).

PHYSOSTIGMINA.—Physostigmine, or eserine, $C_{15}H_{21}O_2N_3$, occurs in large crystals, melting at about 105°; it is tasteless, lævorotatory, and sparingly soluble in water, but readily soluble in alcohol, ether, chloroform, benzene and carbon disulphide. The alkaloid is sometimes employed in the preparation of ointments and oily drops for application to the eye as miotics.

Preparation

Guttæ Physostigminæ Oleosæ, B.P.C.—(Gutt. Physostig. Oleos.)—Eye Drops of Physostigmine in Oil. Physostigmine, 0·5 per cent. w/v, in castor oil.

PHYTOLACCA
(Phytolacc.)

Phytolacca

Synonym—Poke Root.

Phytolacca is the root of *Phytolacca decandra* Linn. (Fam. Phytolaccaceæ), a large herbaceous perennial widely distributed in Eastern and Central North America, and naturalised in Southern Europe. It should be collected in the autumn.

The drug occurs in transverse or longitudinal slices of sparingly-branched, nearly cylindrical roots, rarely exceeding 7 centimetres in diameter. The outer surface is yellowish, reddish, or greyish-brown in colour, longitudinally wrinkled, and marked with narrow, transverse bars of cork; the inner surface, when exposed, is whitish and hard, and the fracture is fibrous. It is odourless, and the taste is sweetish and acrid; the powder is powerfully sternutatory. The smoothed, transverse section exhibits several concentric rings of narrow vascular

bundles alternating with rings of parenchymatous tissue; consequently older roots easily separate into longitudinal fibrous strips, and transverse slices show several concentric ridges of elevated fibrous strands alternating with contracted bands of intervening parenchyma. The most important **microscopical** character is the presence of abundant idioblasts containing bundles of acicular crystals of calcium oxalate; the numerous fibres are thick-walled.

Phytolacca **contains** a very bitter resin, 10 per cent. of a non-reducing sugar, and free formic acid. It has also been said to contain a crystalline, neutral principle (phytolaccin), and traces of an alkaloid (phytolaccine) and phytolaccic acid.

Standard.—Phytolacca contains not more than 5 per cent. of its stem. Ash, not more than 14 per cent.

Phytolacca, in powder (Pulvis Phytolaccæ : Pulv. Phytolacc.), contains the constituents and possesses the microscopical characters of Phytolacca, and complies with the limit for ash of the unground drug.

Action and Uses.—Phytolacca has emetic, purgative and mildly narcotic properties, but is rarely used in medicine. The powdered drug is a powerful sternutatory. It has been employed in chronic rheumatism, usually in the form of tincture (1 in 10) or liquid extract (1 in 1).

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

PICRORHIZA
(Picrorh.)
Picrorhiza

Picrorhiza consists of the dried rhizome of *Picrorhiza Kurroa* Royle (Fam. Scrophulariaceæ), a small plant indigenous to the Himalayas.

The rhizomes are greyish-brown, light in weight, more or less cylindrical, about 2·5 to 5 centimetres long and 4 to 8 millimetres thick. The external surface is deeply wrinkled longitudinally, with transverse scars of cataphyllary leaves, numerous small, black buds and an occasional root or root-scar; near the apex may be present the black remains of closely approximate, scaly leaves. The fracture is short; the smoothed, transverse surface exhibits a thin, pale grey cork, a dark, lacunous cortex, a narrow ring of tangentially elongated, pale coloured vascular bundles and a very dark pith. There are present a few loose roots, which are slender and longitudinally wrinkled. The drug is odourless, and has a very bitter taste.

Picrorhiza **contains** the bitter, crystalline glycoside, picrorhizin, which yields picrorhizetin and dextrose on hydrolysis.

Standard.—Picrorhiza contains not more than 2 per cent. of its stems and other foreign organic matter.

Action and Uses.—Picrorhiza is a bitter, and is used as a tonic and antiperiodic. It is best **administered** as liquid extract [Extractum Picrorhizæ Liquidum, 1 in 1, in doses of 1 to 4 millilitres (15 to 60 minims)], or as tincture [Tinctura Picrorhizæ, 1 in 4 in alcohol (45 per cent.) in doses of 2 to 4 millilitres (30 to 60 minims)], in combination with aromatics.

Dose.—0·6 to 4 grammes (10 to 60 grains).

PICROTOXINUM

(Picrotox.)

Picrotoxin

$C_{30}H_{34}O_{13} = 602·3$

Picrotoxin may be prepared by exhausting powdered cocculus indicus with boiling alcohol and, after concentration, extracting the fatty residue with hot water; on cooling, picrotoxin crystallises, and may be recrystallised from water or alcohol. It occurs as intensely bitter, poisonous, colourless, odourless, shining, prismatic crystals, or as a microcrystalline powder, melting at about 200° to a yellow liquid. The alcoholic solution is lævorotatory and neutral. Amyl alcohol, benzene and chloroform extract picrotoxin from acid, but not from alkaline solutions. It dissolves in sulphuric acid forming a bright yellow solution; the colour changes to orange-violet on warming and becomes green on the addition of potassium dichromate. On the addition of 1 drop of a 20 per cent. solution of anisaldehyde in dehydrated alcohol to picrotoxin moistened with sulphuric acid, a permanent blue colour is obtained. A mixture of picrotoxin and three times its weight of potassium nitrate develops an intense red colour on moistening with strong sulphuric acid and adding a strong solution of sodium hydroxide. Picrotoxin reduces Fehling's solution and ammoniacal silver nitrate solution, and gives no precipitate with the usual alkaloidal precipitants. It is readily decomposed into picrotoxinin, $C_{15}H_{16}O_6$, and picrotin, $C_{15}H_{18}O_7$.

Soluble in water (1 in 334), boiling water (1 in 35), alcohol (1 in 13·5), boiling alcohol (1 in 3), solution of potassium hydroxide (1 in 10), amyl alcohol, benzene, ether, chloroform and glacial acetic acid.

Action and Uses.—Picrotoxin is a powerful convulsive poison, differing from strychnine in that it acts mainly on the medulla. It is used occasionally to check the profuse night-sweats of phthisis through its action in accelerating respiration, thus removing the partial asphyxia and so preventing stimulation of the nervous mechanism governing perspiration; it is successful only in a limited number of cases. Picrotoxin has been employed in the treatment of epilepsy and chronic alcoholism, and as an antidote in morphine poisoning. In the form of an ointment (1 in 50) it has been used as a parasiticide, but it is too dangerous a substance to use in this way. In cases of **poisoning** by

picrotoxin, an emetic should be given or the stomach should be washed out, and chloral hydrate and potassium bromide administered.

Dose.– 0·0006 to 0·0025 gramme ($\frac{1}{100}$ to $\frac{1}{25}$ grain).

PILOCARPINÆ HYDROCHLORIDUM

(Pilocarp. Hydrochlor.)

Pilocarpine Hydrochloride

$C_{11}H_{16}O_2N_2,HCl = 244·6$

Pilocarpine hydrochloride may be prepared by dissolving the base obtained from the nitrate in sufficient dilute hydrochloric acid to form a neutral solution, concentrating, and setting aside over sulphuric acid to crystallise. It occurs in the form of colourless, odourless crystals, deliquescent in moist air. The aqueous solution has a faintly bitter taste, and is neutral or only faintly acid to litmus. Sulphuric acid dissolves it with liberation of hydrogen chloride and the formation of a colourless liquid; on the addition of a small fragment of potassium dichromate, a bright grass-green colouration is produced. It responds to the test for distinction from other alkaloids given under Pilocarpinæ Nitras. A mixture of equal parts of the salt and calomel becomes blackened when moistened with alcohol.

Freely **soluble** in water, and dehydrated alcohol (1 in 10); almost insoluble in ether and chloroform.

Standard.—Pilocarpine hydrochloride, when dried to constant weight at 100°, melts between 204° and 205°. Specific rotation, determined on a 10 per cent. w/**v** aqueous solution, +90° to +92°. Ash, not more than 0·1 per cent. It complies with the tests for absence of certain other alkaloids in Pilocarpinæ Nitras.

Action and Uses.—The action of pilocarpine hydrochloride is similar to that of pilocarpine nitrate. Solutions for injection may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. The containers must comply with the limit of alkalinity of glass, and the solutions should be stored protected from light.

Dose.– 0·003 to 0·012 gramme ($\frac{1}{200}$ to $\frac{1}{5}$ grain).

PILOCARPINÆ HYDROBROMIDUM. — Pilocarpine hydrobromide, $C_{11}H_{16}O_2N_2,HBr$, occurs in the form of white crystals, soluble in water and alcohol and melting at 185°. It is used for the same purposes as pilocarpine hydrochloride. Dose.– 0 003 to 0·012 gramme ($\frac{1}{200}$ to $\frac{1}{5}$ grain).

Preparation

Syrupus Potassii Bromidi et Pilocarpinæ, B.P.C.—(Syr. Pot. Brom. et Pilocarp.)—Syrup of Potassium Bromide and Pilocarpine. Potassium bromide, 10 per cent. w/v, and pilocarpine hydrobromide, 0·005 per cent. w/v, with glycerin and syrup of orange; each fluid drachm contains about $5\frac{1}{2}$ grains of potassium bromide and $\frac{1}{120}$ grain of pilocarpine hydrobromide. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

PILOCARPINÆ NITRAS

(Pilocarp. Nit.)

Pilocarpine Nitrate

$C_{11}H_{16}O_2N_2,HNO_3 = 271{\cdot}2$

Pilocarpine nitrate is the salt of an alkaloid, pilocarpine, obtained from the leaves of species of *Pilocarpus*. It occurs in the form of colourless crystals or as a white, crystalline powder, without odour but with a faintly bitter taste. The 5 per cent. aqueous solution is neutral to methyl red, but slightly acid to litmus; it yields no precipitate on the addition of solution of ammonium, sodium, or potassium hydroxide. Pilocarpine salts may be distinguished from the salts of other alkaloids by the following colour reaction. To a few millilitres of a 1 in 500 aqueous solution, acidified by the addition of one or two drops of dilute sulphuric acid, add an equal volume of solution of hydrogen peroxide, and pour a layer of benzene on the mixed liquids; then add one or two drops of a solution of potassium chromate or dichromate and shake well; the benzene layer acquires a bluish-violet colouration, while the aqueous layer remains yellow. Pilocarpine nitrate is stated to contain varying amounts of *iso*pilocarpine nitrate, which lowers the melting-point; the chemically pure salt melts at 177° to 178°.

Soluble in water (1 in 8), alcohol (90 per cent.) (1 in 50); almost insoluble in chloroform and ether.

Standard, B.P.—Pilocarpine nitrate has a melting-point of 174° to 178°. Specific rotation of a 10 per cent. w/v aqueous solution, +77° to +83°. Ash, not more than 0·1 per cent. It complies also with tests for the absence of certain other alkaloids and with a limit test for readily carbonisable substances.

Action and Uses.—The general action of pilocarpine is to stimulate the parasympathetic nerve endings of plain muscle, the heart and secretory glands. Its action is therefore a peripheral one, and any effect on the central nervous system is insignificant. Pilocarpine is a powerful sudorific, and was formerly much employed in various conditions in which excess of fluid accumulates in the body, notably in renal œdema and in uræmia. Owing to its depressant action on the heart it is now rarely used. The drug also causes augmented secretion from the salivary, gastric, pancreatic and intestinal glands, also from the mucous glands of the mouth, nose and respiratory tract, the main increase being in the water content. Milk, bile and urine are uninfluenced. It stimulates the motor nerve endings of the plain muscle of the gut and produces nausea, vomiting and diarrhœa. Pilocarpine decreases the frequency of the heart, contracts the bronchioles, and by its action on the spleen produces a leucocytosis.

In ophthalmic surgery, pilocarpine has been used as a substitute for physostigmine to contract the pupil and decrease the intra-ocular tension in glaucoma and detachment of the retina, but it is only about

half as active. For this purpose a 2 per cent. w/v solution may be employed, or a gelatin lamella containing 0·00025 gramme ($\frac{1}{240}$ grain) may be placed in the conjunctival sac. Its action on the eye is less complete and of shorter duration than that of physostigmine, and a slight increase of tension may occur at first. Pilocarpine has been given by the mouth to relax the cardiac sphincter in cases of cardiospasm. The action of pilocarpine is in all cases antagonised by atropine, but in cases of atropine poisoning the use of pilocarpine is quite unjustifiable, for the reason that pilocarpine in no way antagonises the dangerous action of atropine on the brain. Pilocarpine nitrate is best **administered** by hypodermic injection in doses of from 0·006 to 0·016 gramme ($\frac{1}{10}$ to $\frac{1}{4}$ grain). Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. The containers must comply with the limit of alkalinity of glass, and the solutions should be stored protected from light. Pills may be prepared with lactose and dextrose. Larger initial doses than 0·003 gramme ($\frac{1}{20}$ grain) by the mouth are not well tolerated. It has been recommended for use in lotions (1 in 250) to promote the growth of the hair, its effect being attributed to stimulation of the glands of the scalp. In cases of **poisoning** by pilocarpine, the stomach should be emptied and atropine given hypodermically.

Dose.– 0·003 to 0·012 gramme ($\frac{1}{20}$ to $\frac{1}{5}$ grain).

Preparation

Guttæ Pilocarpinæ, B.P.C.—(Gutt. Pilocarp.)—Pilocarpine Eye Drops. Pilocarpine nitrate, 0·5 per cent. w/v, in sterilised water.

PIMENTA

(Piment.)

Pimento

Synonyms—Allspice; Jamaica Pepper.

Pimento consists of the dried, full-grown but unripe fruits of *Pimenta officinalis* Lindl. (Fam. Myrtaceæ), a tree indigenous to the West Indies, and cultivated in Jamaica and other islands.

The fruits are nearly globular berries, about 5 to 8 millimetres in diameter, dark reddish-brown, with a rough, brittle pericarp, crowned with the remains of the calyx surrounding the short style. The fruit is two-celled, each cell containing a single, brownish-black, reniform seed. The odour and taste are aromatic, having some resemblance to those of clove. The liquid obtained by boiling a few of the fruits with dilute hydrochloric acid, and filtering, gives not more than a faint bluish-green tint when treated with potassium ferrocyanide solution.

The diagnostic **microscopical** characters are the one-celled, conical, thick-walled hairs and small polygonal cells, having a rather

thick cuticle, from the epidermis; the numerous oil glands situated in the parenchyma immediately beneath the epidermis; the abundant, lignified, sclerenchymatous cells from the pericarp; the polygonal cells from the cotyledons, containing starch, mostly in compound grains, individual grains being muller-shaped.

Pimento **contains** from 3 to 4·5 per cent. of volatile oil containing about 70 per cent. of eugenol. Other constituents are small amounts of eugenolmethylether, cineole, *l*-α-phellandrene and caryophyllene.

Substitutes.—Fruits which have been collected when ripe or very nearly ripe become almost black on drying; they are sometimes made more attractive by colouring them with bole or brown ochre.

Standard.—Pimento yields not more than 6 per cent. of ash.

Pimento, in powder (Pulvis Pimentæ : Pulv. Piment.), contains the constituents and possesses the diagnostic microscopical characters of Pimenta, and complies with the standard for the unground drug.

Action and Uses.—Pimento is an aromatic stimulant and carminative resembling clove in its action. It is used principally for the production of Oleum Pimentæ, in which form it is generally employed in medicine.

Preparation

Aqua Pimentæ Concentrata, B.P.C.—(Aq. Piment. Conc.)—Concentrated Pimento Water. Oil of Pimento, 1 in 50. When pimento water (Aqua Pimentæ) is ordered, this preparation diluted with 39 times its volume of distilled water may be dispensed. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

PINUS ALBA
(Pinus Alb.)
White Pine

Synonym—White Pine Bark.

White pine is the bark of the Weymouth pine, *Pinus Strobus* Linn. (Fam. Pinaceæ), deprived of the cork and part of the cortex, and dried. The Weymouth pine grows throughout the North-Eastern United States of America and in Canada.

The bark occurs in flat pieces, about 30 centimetres long, 15 centimetres wide and 1 to 3 millimetres thick; the longer pieces, which may be up to 80 centimetres long, are often folded. The outer surface is pinkish-yellow to brown, coarsely striated, with a few small patches of grey-brown periderm, and numerous small cavities containing oleoresin; the inner surface is yellowish-brown, finely striated longitudinally and transversely corrugated. The bark is tough and the fracture very fibrous. The odour is slight and terebinthinate, and the taste sweetish, bitter and astringent.

White pine **contains** volatile oil, tannin, mucilage and resin.

Action and Uses.—White pine is used in conjunction with other medicaments as an ingredient of cough syrups.

Preparations

Extractum Pini Albi Liquidum, B.P.C.—(Ext. Pini Alb. Liq.)—Liquid Extract of White Pine. 1 in 1. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Syrupus Pini Albi Compositus, B.P.C.—(Syr. Pini Alb. Co.)—Compound Syrup of White Pine. Liquid extract of white pine, 1 in 20, and syrup of tar, 1 in 5, with liquid extract of squill, solution of bordeaux B, ammonium chloride, sucrose, glycerin and distilled water. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

PINUS CANADENSIS

(Pinus Canad.)

Hemlock Spruce

Synonyms—Pinus Bark; Hemlock Spruce Bark.

Hemlock spruce is the dried inner bark of the trunk and branches of *Tsuga canadensis* Carr (Fam. Pinaceæ), a large tree indigenous to Eastern North America.

The bark occurs in flattened pieces of varying size, about 5 millimetres thick, the outer surface being coarsely striated longitudinally, cinnamon-brown or dark brown, with occasional patches of the purplish-pink rhytidome and dark grey cork. When the outer bark is present, it is brownish-grey in colour, longitudinally wrinkled, and marked with reddish-brown transverse lenticels. The inner surface is striated and yellowish-brown, with numerous small glistening points. The fracture is fibrous. The smoothed, transverse section viewed under a lens shows here and there externally a thin, pinkish-purple line, the rhytidome, within which is the cinnamon-brown secondary phloem with numerous paler, scattered groups of sclerenchymatous cells. The odour is slight, and the taste strongly astringent.

Hemlock spruce **contains** from 8 to 15 per cent. of tannin, but the bark also contains a little resin and volatile oil. The tannin appears to be identical with that of oak bark, and an extract of the bark is used in tanning. A substance resembling Burgundy pitch exudes from the trunk and hardens on the bark; it is known as hemlock pitch or Canada pitch, and has rubefacient properties similar to those of Burgundy pitch; it is separated from the bark by boiling with water, and consists of resin with a trace of volatile oil. Hemlock spruce, or spruce needle, oil contains *l*-pinene, *l*-bornyl acetate and sesquiterpenes. The ash of hemlock spruce is about 2 per cent.; it yields to alcohol (45 per cent.) about 15 per cent. of extractive.

Action and Uses.—Hemlock spruce is used as an astringent in catarrhal diseases of the mucous membrane. The liquid extract,

diluted 1 in 10 of water, has been employed as an injection in the treatment of leucorrhœa and gonorrhœa, and is given internally for diarrhœa.

Preparation

Extractum Pini Canadensis Liquidum, B.P.C.—(Ext. Pini Canad. Liq.)—Liquid Extract of Hemlock Spruce. 1 in 1. Dose.—1 to 4 millilitres (¼ to 1 fluid drachm).

PIPER NIGRUM
(Piper Nig.)

Black Pepper

Synonym—Piper.

Black pepper consists of the dried, unripe fruits of *Piper nigrum* Linn. (Fam. Piperaceæ), a climbing plant indigenous to South India, and cultivated there as well as in the islands of the Malay Archipelago, the Malay Peninsula, Siam, etc.

The fruits are subspherical, dark brown, superior, and about 3·5 to 6 millimetres in diameter. The surface is deeply and coarsely reticulately wrinkled; at the apex the remains of a sessile stigma is visible. The odour is aromatic and the taste pungent. A vertical section of the fruit shows a thin, narrow, dark pericarp, within which is the whitish kernel of the single seed, to which the pericarp firmly adheres. The kernel consists almost entirely of perisperm, which is hollow at the centre, and surrounds at its apex the scanty endosperm in which the minute embryo is embedded.

The diagnostic **microscopical** characters are the tabular epidermal cells containing small rectangular crystals about 6 to 10 microns long; the hypodermis of thin-walled parenchyma containing numerous groups of rectangular or polygonal stone cells with rather large lumina; the inner pericarpic sclerenchyma consisting of a single layer of brown, lignified beaker cells; the reddish-brown seed coat, usually with the hyaline layer attached; the abundant starch, mostly in large polyhedral masses, individual grains being angular and up to 7 microns in diameter; the oil cells of the perisperm and pericarp.

Black pepper **contains** 5 to 9 per cent. of a colourless, crystalline alkaloid, piperine, 1·0 to 2·5 per cent. of a volatile oil (specific gravity, 0·890 to 0·900; refractive index at 20°, 1·4935 to 1·4977; optical rotation, −2·7° to −4·6°; consisting almost entirely of sesquiterpenes), and about 6 per cent. of a pungent, green resin, chavicine, isomeric with piperine. Piperidine is stated to be invariably a constituent of pepper, probably derived from the decomposition of the piperine. It contains also about 30 per cent. of starch and yields about 6 per cent. of non-volatile ether extractive.

Varieties.—There are several varieties of black pepper distinguished by the names of their places of origin. The more usual are Trang, Tellicheri, Saigon, Lampong and Acheen. They differ somewhat in appearance, varying from greyish-brown to brownish-black in colour according to the methods used in drying, some varieties being smoked in kilns while others are dried without artificial heat.

Standard.—Black pepper contains not more than 2 per cent. of foreign organic matter. Ash, not more than 6 per cent. Acid-insoluble ash, not more than 1 per cent.

Black pepper, in powder (Pulvis Piperis Nigri : Pulv. Piper. Nig.), contains the constituents and possesses the diagnostic microscopical characters of Piper Nigrum, and complies with the limits for ash and acid-insoluble ash of the unground drug.

Action and Uses.—Black pepper possesses in a high degree the stimulating and carminative properties of the volatile oils, causing a reflex flow of saliva, with increased secretion of gastric juice and improved appetite. Gastro-intestinal movements are augmented, with consequent eructation of gas and relief of colic. In sufficient doses, the peppers dilate the superficial vessels of the skin, causing a feeling of warmth, followed by diaphoresis and some reduction of temperature. On account of these properties they are much employed as condiments, especially in hot countries. Black pepper is a diuretic, and is sometimes used in place of cubeb in gonorrhœa and urethritis, but is apt to irritate. It is **administered** as Confectio Piperis, often with confection of senna. In conjunction with opium and other carminatives it is employed as Pulvis Opii Compositus.

Dose.—0·3 to 0·6 gramme (5 to 10 grains).

PIPER ALBUM.—White pepper is the fruit of *P. nigrum*, but is composed of the ripe fruits which have been deprived of their outer coating by soaking in water and rubbing, and then dried in the sun. It contains less volatile oil and, compared with black pepper, is lacking in aroma. The commoner commercial varieties are known as Java, Siam, Saigon, Montok, Singapore and Penang. Powdered white pepper may be made by grinding the white pepper or by treating black pepper in special machines which remove the pericarp, the inner portion or perisperm alone being ground to powder. The latter gives a product of superior aroma.

PIPER LONGUM.—Long pepper is the dried, unripe fructification of *Piper Chaba* Hunter (Fam. Piperaceæ), a plant indigenous to the Malay Archipelago. The fructification consists of a dense spike about 3·5 centimetres long and 0·5 centimetre in diameter. The taste and odour are like those of black pepper, but not so strong. It contains about 1 per cent. of volatile oil and about 5 per cent. of piperine, a pungent resin (chavicine) and starch. Long pepper has been employed as a stimulant and carminative, its properties residing principally in the volatile oil and resin. For medicinal preparations black pepper is usually preferred. Dose.—0·3 to 0·6 gramme (5 to 10 grains).

Preparations

Confectio Piperis, B.P.C.—(Conf. Piper.)—Confection of Pepper. Black pepper, 1 in 10, with caraway and purified honey. Dose.—4 to 8 grammes (1 to 2 drachms).

This confection was included in the British Pharmacopœia, 1914.

Pilulæ Asiaticæ, B.P.C.—(Pil. Asiatic.)—Asiatic Pills. Each pill contains $\frac{1}{12}$ grain of arsenic trioxide and $\frac{3}{4}$ grain of black pepper. Dose.—1 pill.

PIPERAZINA
(Piperaz.)

Piperazine

$C_4H_{10}N_2,6H_2O = 194{\cdot}2$

Synonym—Piperazine Hydrate.

Piperazine is the hydrate of a heterocyclic base which may be prepared by the action of ammonia on ethylene dibromide. It occurs in the form of colourless, glassy, lustrous, deliquescent tablets, absorbing carbon dioxide from the air and forming the carbonate, and having a strongly alkaline reaction, a saline taste, and a faint but characteristic odour. Anhydrous piperazine, $C_4H_{10}N_2$, melts between 108° and 110°.

Readily **soluble** in water, somewhat less so in alcohol; its aqueous solution readily decomposes.

Standard.—Piperazine melts between 43° and 44°. Ash, not more than 0·1 per cent. 1 gramme complies with the limit test for chlorides. 1 gramme complies with the limit test for sulphates.

Action and Uses.—Piperazine has been used for gout and rheumatism, on the supposition that it would prevent or remove deposits of uric acid in the system by forming soluble urates which would be eliminated in the urine. It is, however, extremely doubtful whether any such solvent action is exerted in the body. It may be **administered** as Piperazina Effervescens. Piperazine is incompatible with acetanilide, alkaloidal salts, spirit of nitrous ether, sodium salicylate and salts of iron and mercury.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparation

Piperazina Effervescens, B.P.C.—(Piperaz. Efferv.)—Effervescent Piperazine. About 1 in 12. Dose.– 4 to 12 grammes (1 to 3 drachms).

PISCIDIA
(Piscid.)

Piscidia

Synonym—Jamaica Dogwood.

Piscidia is the root-bark of *Piscidia Erythrina* Linn. (Fam. Leguminosæ), a shrub found in tropical America and the West Indies, where it is used as a fish poison.

The root-bark occurs in quills or curved pieces, 5 to 15 centimetres or up to 1 metre in length, 2 to 8 centimetres broad and 4 to 6 millimetres thick. The outer surface is orange-brown where the cork is present, and dark greyish-brown where the cork is exfoliated; it

is wrinkled, with thin projecting edges of exfoliating scales of the outer cork, and somewhat fissured. Where the surface is scraped the exposed phloem is greenish-black. Older pieces are dull reddish-brown, with reddish, corky warts and transverse fissures at intervals. The inner surface is brownish, smooth and finely chequered. The fracture is short and even in the outer part, somewhat splintery internally. The odour is characteristic, and the taste somewhat acrid.

Piscidia **contains** resin, fat, a crystallisable substance named piscidin, and a bitter glycoside which is soluble in water.

Action and Uses.—Piscidia exerts a sedative action, and is employed to reduce sensibility to pain. In the form of liquid extract it is used in the treatment of dysmenorrhœa. It has also been employed to induce sleep, and to relieve the pain of toothache, neuralgia, etc.

Preparation

Extractum Piscidiæ Liquidum, B.P.C.—(Ext. Piscid. Liq.)—Liquid Extract of Piscidia. 1 in 1. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

PITUITARIUM
(Pituit.)

Pituitary

Synonyms—Dry Pituitary Gland; Dry Pituitary; Desiccated Pituitary.

Pituitary consists of the cleaned and dried pituitary bodies or glands obtained from oxen or other mammals. The pituitary gland or hypophysis is situated below the brain in a depression (sella turcica) in the bony case which encloses the brain. It consists of two main parts; (1) a stalk, or infundibulum, which descends from the part of the brain known as the tuber cinereum, this portion of the gland being called the posterior lobe [pituitary (posterior lobe)]; (2) a portion about four times larger, which enfolds the posterior lobe in front, below and at the sides, this portion being known as the anterior lobe [pituitary (anterior lobe)]. The two lobes are separated by a narrow strip of tissue known as the pars intermedia. In order to avoid confusion it is necessary, therefore, to distinguish between the three products—pituitary, pituitary (anterior lobe) and pituitary (posterior lobe). The fresh gland yields about one-fifth of its weight of pituitary. Pituitary occurs as a yellowish or greyish, amorphous powder, having a characteristic odour. It is only partly **soluble** in water.

Action and Uses.—Pituitary, pituitary (anterior lobe) and pituitary (posterior lobe) are used in medicine for oral administration, but there is no generally accepted experimental or clinical evidence of their value. They are **administered** in capsules or tablets in doses of 0·03 to 0·3 gramme (½ to 5 grains) of desiccated gland, 0·03 to 0·3 gramme

($\frac{1}{2}$ to 5 grains) of anterior lobe and 0·003 to 0·03 gramme ($\frac{1}{20}$ to $\frac{1}{2}$ grain) of posterior lobe. Pituitary and posterior pituitary are given in certain forms of obesity, and for low blood pressure and intestinal stasis; anterior pituitary is given, often with thyroid, to promote the growth of backward children. Both the anterior and posterior lobes, however, contain active principles which are readily extracted and possess striking physiological properties (see Extractum Pituitarii Liquidum). Desiccated pituitary (posterior lobe) powder is occasionally employed as a snuff in doses of 0·04 gramme ($\frac{2}{3}$ grain) in the treatment of diabetes insipidus. Dry pituitary (posterior lobe) powder is also used as a laboratory standard in the biological assay of pituitary (posterior lobe) extract; for this purpose the posterior lobe of fresh pituitary gland of oxen is extracted with acetone, dried, and assayed by comparison with a standard preparation kept in the National Institute for Medical Research, London.

PIX BURGUNDICA

(Pix Burgund.)

Burgundy Pitch

Burgundy pitch is a resinous exudation obtained from the stem of *Picea excelsa* Link (Fam. Pinaceæ) and purified by melting and straining. It is obtained from Finland and the Black Forest. Incisions are made in the bark, and the exuding oleo-resin is scraped out of the holes in which it has solidified; it is then melted under water and strained. It is an opaque, hard, brittle, reddish or yellowish-brown substance, which gradually assumes the form of the vessel in which it is kept. It breaks with a clean, conchoidal fracture. The odour is aromatic, and the taste sweet and aromatic.

Burgundy pitch **contains** a little volatile oil and resin; the latter appears to consist of α-and β-piceapimarolic acids with small quantities of piceapimarinic and piceapimaric acids, and a resene (juroresene). A factitious Burgundy pitch is prepared by melting together common pitch, colophony and turpentine, and agitating the mixture with water. Its odour differs from that of the genuine substance, and it does not form a clear solution with glacial acetic acid.

Soluble in twice its weight of glacial acetic acid; readily soluble in alcohol.

Action and Uses.—Burgundy pitch is a mild counter-irritant, and is employed in the preparation of plasters. Emplastrum Picis is used in chronic bronchitis, rheumatism and lumbago.

Preparation

Emplastrum Picis, B.P.C.—(Emp. Pic.)—Plaster of Pitch. *Syn.*—Poor Man's Plaster. Burgundy pitch, about 1 in 2, with olibanum, colophony, yellow beeswax, olive oil and distilled water.

PIX CARBONIS

(Pix Carbon.)

Coal Tar

Coal tar is a product obtained by the destructive distillation of bituminous coal at about 1000°. It occurs as a thick, nearly black, viscid liquid, with a strong, penetrating, characteristic odour. The alkalinity of its aqueous solutions serves to distinguish coal tar from tar obtained from wood or lignite, or by the destructive distillation of bituminous coal at temperatures below 600°. The surface of water in contact with coal tar shows by reflected light a blue, metallic lustre. Specific gravity, about 1·15. On exposure to the air, it gradually becomes hardened. It burns on ignition with a luminous, sooty flame.

The chief **constituents** of coal tar are benzene, C_6H_6, and its homologues, isolated by fractional distillation from the light oil (boiling-point below 170°); phenol, cresols and naphthalene, $C_{10}H_8$, from the middle (or carbolic) oil (boiling-point, 170° to 230°); cresols and their homologues from the heavy oil (boiling-point, 230° to 270°); anthracene, $C_{14}H_{10}$, from the green oil (boiling-point, 270° to 400°); the residue is pitch. The tar also contains small quantities of basic compounds such as aniline, pyridine, acridine, carbazole, etc., and sulphur compounds such as thiophene, C_4H_4S.

Slightly **soluble** in water; partially soluble in alcohol, ether, chloroform, benzene and volatile oils.

Standard.—Coal tar leaves not more than 2 per cent. of ash. Water shaken with coal tar acquires an alkaline reaction.

Action and Uses.—Coal tar has antiseptic, stimulating and antipruritic properties, and is employed for application to the skin in pruritus, psoriasis, eczema and other skin affections. Prepared coal tar is used for the same purposes, but by some is considered to be less efficacious than the crude coal tar. Liquor Picis Carbonis is used in lotions and ointments, but should not be used when there is inflammation of the skin.

Preparations

Liquor Picis Carbonis, B.P.—(Liq. Pic. Carbon.)—Solution of Coal Tar. It is prepared by macerating prepared coal tar, 20 per cent. w/v, and quillaia in alcohol (90 per cent.) or in industrial methylated spirit, suitably diluted.

Lotio Picis Carbonis Alkalina, B.P.C.—(Lot. Pic. Carbon. Alk.)—Alkaline Lotion of Coal Tar. Solution of coal tar, about 1 in 50, and sodium bicarbonate, in distilled water.

Lotio Picis Carbonis et Plumbi, B.P.C.—(Lot. Pic. Carbon. et Plumb.)—Coal Tar and Lead Lotion. Solution of coal tar and strong solution of lead subacetate, of each about 1 in 30, in distilled water.

Pasta Picis Carbonis, B.P.C.—(Past. Pic. Carbon.)—Coal Tar Paste. Coal tar, about 3·5 per cent., with compound paste of zinc oxide.

Pix Carbonis Præparata, B.P.—(Pix Carb. Præp.)—Prepared Coal Tar. Coal tar deprived of its more volatile constituents by heating at 50°.

Unguentum Picis Carbonis, B.P.C.—(Ung. Pic. Carbon.)—Coal Tar Ointment. Solution of coal tar, about 6 25 per cent., in yellow soft paraffin.

Unguentum Picis Carbonis Compositum, B.P.C.—(Ung. Pic. Carbon. Co.)—Compound Coal Tar Ointment. Solution of coal tar, about 6·25 per cent., and ammoniated mercury, about 3 per cent., in yellow soft paraffin.

PIX LIQUIDA
(Pix Liq.)

Tar

Synonym—Stockholm Tar.

Tar is the bituminous liquid obtained by the destructive distillation of the wood of the Scotch fir, *Pinus sylvestris* Linn., and other members of the Family, Pinaceæ. It occurs as a dark brown or blackish, semi-liquid substance, with a strong, characteristic, empyreumatic odour, and a bitter, pungent, empyreumatic taste. It has a specific gravity of about 1·020 to 1·150. It is transparent in thin layers if free from water. When stored for some time, it separates into an under layer of granular character, due to minute crystallisation of catechol, resin acids, etc., and a surface layer of a syrupy consistence. Tar has an acid reaction which is imparted to water when shaken with it, and it may thereby be distinguished from coal tar, which has an alkaline reaction. When water is shaken with tar, filtered, if necessary through diatomite, and treated with one or two drops of 1 in 1000 solution of ferric chloride, a red colour is produced; under similar conditions, birch tar gives a green colouration. Tar may be distinguished from beech tar by shaking a light petroleum extract with dilute copper acetate solution; the light petroleum layer is coloured green.

Soluble in alcohol (90 per cent.) (1 in 10), ether, chloroform, fixed and volatile oils, glacial acetic acid and dilute solutions of alkali hydroxides; almost insoluble in water.

Standard, B.P.—Tar is the wood tar known in commerce as Stockholm tar.

Action and Uses.—Tar has antiseptic properties and is given as an expectorant in chronic bronchitis and to relieve the cough of phthisis; it is also mixed with hot water and the vapour inhaled for the same purpose. Tar is **administered** as Syrupus Picis Liquidæ, often with syrup of codeine phosphate. It may also be given in gelatin capsules or in pills. **Externally,** tar is employed in chronic skin diseases, especially in psoriasis and eczema. Its action in allaying pruritus is not so marked as that of coal tar. It may be used as Unguentum Picis Liquidæ, which may be reduced in strength and softened, if required, by the addition of olive oil or lard.

Dose.– 0·12 to 0·6 gramme (2 to 10 grains).

Preparations

Syrupus Pini Albi Compositus, B.P.C.—(Syr. Pini Alb. Co.)—Compound Syrup of White Pine. Liquid extract of white pine, 1 in 20, and syrup of tar, 1 in 5, with liquid extract of squill, solution of bordeaux B, ammonium chloride, sucrose, glycerin and distilled water. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Syrupus Picis Liquidæ, B.P.C.—(Syr. Pic. Liq.)—Syrup of Tar. Tar, 0·5 per cent. w/v, with alcohol (90 per cent.), sucrose and distilled water. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Unguentum Picis Liquidæ, B.P.C.—(Ung. Pic. Liq.)—Tar Ointment. Tar, 70 per cent., in lard and yellow beeswax.

This ointment was included in the British Pharmacopœia, 1914.

Unguentum Sulphuris Compositum, B.P.C.—(Ung. Sulphur. Co.)—Compound Sulphur Ointment. Sublimed sulphur and tar, of each, 15 per cent., and calcium carbonate, 10 per cent., in lard and soft soap.

PLUMBI ACETAS

(Plumb. Acet.)

Lead Acetate

$C_4H_6O_4Pb,3H_2O = 379·3$

Synonym—Sugar of Lead.

Lead acetate, $(CH_3·COO)_2Pb,3H_2O$, may be prepared by dissolving finely divided lead monoxide in hot acetic acid, filtering the solution while hot and allowing it to crystallise. It occurs in the form of small, white, transparent, monoclinic prisms or heavy, crystalline masses, having a faint, acetous odour and a sweet, astringent taste. It is efflorescent in warm air, and absorbs carbon dioxide on exposure, then forming with water an opalescent solution. It becomes anhydrous when dried at 40°. If heated rapidly to 75° it melts in its water of crystallisation, and at a higher temperature it is converted into a basic salt which fuses at about 280° with continued loss of acetic acid, finally undergoing complete decomposition with evolution of acetone and carbon dioxide, leaving a residue of finely divided metallic lead mixed with oxide and carbonate. It forms a clear, slightly acid solution with water free from carbon dioxide.

Soluble in water (1 in 2·5), alcohol (90 per cent.) (1 in 30), glycerin (1 in 2).

Standard, B.P.—Lead acetate contains not less than 99·5 per cent. and not more than the equivalent of 104·5 per cent. of $C_4H_6O_4Pb,3H_2O$. It complies with a test for solubility in water, with a test for the absence of copper, iron, zinc and silver, and with a limit test for chloride.

Action and Uses.—Lead salts are used in medicine chiefly for their protective and astringent action, either on the skin, or on the vaginal, urethral, and rectal mucous membranes in inflammatory conditions, or,

when taken internally, to arrest diarrhœa. In all cases their astringent action is due to the formation of lead albuminate, which, in contact with mucous membranes, forms a protective coating and prevents further penetration of the metal. On account of the formation of insoluble lead albuminate, salts of lead taken internally are absorbed with extreme slowness; nevertheless, owing to still slower excretion, cumulation may occur, and lead poisoning frequently results from the ingestion of lead in small quantities over a prolonged period. The symptoms of plumbism are anæmia and severe abdominal colic, accompanied by obstinate constipation and often by vomiting. Examination of the gums shows a blue line on the free border, due to a deposit of lead sulphide. There may also be paralyses, of which paralysis of the extensor muscles of the fore-arm is much the commonest. Epileptiform convulsions, optic neuritis, retinitis and contracted granular kidneys are other conditions which may be caused by chronic lead poisoning. Lead has a specific action on all muscular tissue; it excites automatic contractions in plain muscle fibres, the effect on the intestinal walls being to produce lead colic, and on the uterus to cause menorrhagia, or, if pregnant, to expel its contents. Striped muscle under the action of lead is easily exhausted and fails to respond to stimulation, subsequently undergoing degeneration. Lead diminishes the excretion of uric acid and is regarded as a predisposing cause of gout.

Internally, lead acetate is employed in diarrhœa, dysentery, cholera, hæmoptysis and in intestinal ulcerations of tubercular or typhoid origin. It is **administered** in pills and tablets. **Externally,** it is sometimes used for vaginal and urethral injections (1 in 250). Glycerinum Plumbi Subacetatis, diluted with paraffin ointment, or with 4 to 6 parts of glycerin, forms an emollient and healing application in eczema and chronic ulcerations. Lotions (1 part to 8 parts of water) are used in pruritus ani and (1 part to 40 parts of water) as vaginal injections. Liquor Plumbi Subacetatis Dilutus and Lotio Plumbi Evaporans are employed largely in soothing and astringent lotions for burns and bruises. Unguentum Plumbi Acetatis and Unguentum Plumbi Subacetatis are used in pruritus ani, as astringent applications for piles, and for inflammatory conditions of the skin and mucous membranes. Suppositorium Plumbi cum Opio soothes the pain and arrests the bleeding of hæmorrhoids. Solutions of lead subacetate are not suitable for use in eye lotions. Lead acetate is **incompatible** with carbonates, chlorides, iodides, sulphates, phosphates and tannic acid.

The treatment of chronic lead **poisoning** should be preventive as well as curative (see Calcii Chloridum). Drinks containing sulphuric acid form insoluble lead sulphate, and potassium iodide aids in the excretion of lead from the system, but it should not be forgotten that it is possible for sufficient lead sulphate to be absorbed to cause poisonous effects. In order to render lead salts insoluble when accidentally swallowed, milk and white of egg should be given, and a purgative dose of magnesium sulphate or sodium sulphate should follow.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

Preparations

Glycerinum Plumbi Subacetatis, B.P.C.—(Glycer. Plumb. Subacet.)—Glycerin of Lead Subacetate. A glycerin solution of the residue obtained by evaporating strong solution of lead subacetate.

This glycerin was included in the British Pharmacopœia, 1914.

Liquor Plumbi Subacetatis Dilutus, B.P.—(Liq. Plumb. Subacet. Dil.)—Dilute Solution of Lead Subacetate. *Syn.*—Liquor Plumbi Subacetatis; Goulard's Lotion; Goulard Water; Lotio Plumbi; Lead Lotion; Liquor Plumbi. Strong solution of lead subacetate, 1 in 80, in distilled water. It should be freshly prepared.

Liquor Plumbi Subacetatis Fortis, B.P.—(Liq. Plumb. Subacet. Fort.)—Strong Solution of Lead Subacetate. *Syn.*—Goulard's Extract; Liquor Plumbi Fortis. It contains not less than 19 per cent. and not more than 21·5 per cent. w/w of total Pb, and has an alkalinity corresponding to not less than 10·2 per cent. and not more than 11·6 per cent. w/w of PbO. It should be stored in well-filled, well-closed containers.

Lotio Picis Carbonis et Plumbi, B.P.C.—(Lot. Pic. Carbon. et Plumb.)—Coal Tar and Lead Lotion. Solution of coal tar and strong solution of lead subacetate, of each about 1 in 30, in distilled water.

Lotio Plumbi cum Opio, B.P.C.—(Lot. Plumb. c. Opio)—Lead and Opium Lotion. Tincture of opium, 1 in 20, in dilute solution of lead subacetate.

Lotio Plumbi Evaporans, B.P.C.—(Lot. Plumb. Evap.)—Evaporating Lead Lotion. Strong solution of lead subacetate, 1 in 80, and alcohol (90 per cent.), 1 in 5, in distilled water.

Pilulæ Plumbi cum Opio, B.P.C.—(Pil. Plumb. c. Opio)—Lead Pills with Opium. Each pill contains 1½ grains of lead acetate and about ¼ grain of powdered opium. Dose.– 1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914, *under the name of Pilula Plumbi cum Opio.*

Suppositorium Plumbi cum Opio, B.P.—(Supp. Plumb. c. Opio)—Suppository of Lead with Opium. *Syn.*—Suppositorium Plumbi Compositum. Each suppository contains 0·2 gramme (3 grains) of lead acetate and 0·06 gramme (1 grain) of powdered opium, equivalent to about 0·006 gramme (1/10 grain) of anhydrous morphine.

Tabellæ Plumbi cum Opio, B.P.C.—(Tab. Plumb. c. Opio)—Tablets of Lead with Opium. Each tablet contains 3 grains of lead acetate, ½ grain of powdered opium, and sucrose. Dose.– 1 tablet.

Unguentum Glycerini Plumbi Subacetatis, B.P.C.—(Ung. Glycer. Plumb. Subacet.)—Glycerin of Lead Subacetate Ointment. Glycerin of lead subacetate, about 16·5 per cent. w/w, in white paraffin ointment.

Unguentum Hydrargyri Plumbi et Zinci, B.P.C.—(Ung. Hydrarg. Plumb. et Zinc.)—Mercury, Lead and Zinc Ointment. *Syn.*—Unguentum Metallorum. Ointment of mercuric nitrate, ointment of lead subacetate and ointment of zinc oxide, equal parts.

Unguentum Plumbi Acetatis, B.P.C.—(Ung. Plumb. Acet.)—Lead Acetate Ointment. Lead acetate, 4 per cent., in white paraffin ointment.

Unguentum Plumbi Subacetatis, B.P.C.—(Ung. Plumb. Subacet.)—Lead Subacetate Ointment. Strong solution of lead subacetate, 12·5 per cent. w/w, in wool fat and hard and soft paraffins.

This ointment was included in the British Pharmacopœia, 1914.

PLUMBI CARBONAS
(Plumb. Carb.)
Lead Carbonate

Synonyms—White Lead; Cirussa.

Lead carbonate is a basic lead carbonate closely approximating in composition to the formula, $2PbCO_3,Pb(OH)_2$, and may be prepared by interaction of basic lead acetate and carbon dioxide. It occurs as a white, odourless, tasteless, heavy, non-gritty, amorphous powder, or as a white, easily pulverisable mass. The solution in nitric acid is precipitated by sodium hydroxide, the precipitate being soluble in excess of the alkali. When heated to 155°, the carbonate loses the elements of water, at 180° it loses carbon dioxide and turns yellow, and on charcoal in the blow-pipe flame it yields globules of metallic lead surrounded by a reddish-yellow incrustation. The normal carbonate, $PbCO_3$, is obtained by precipitation from a solution of a lead salt with ammonium carbonate.

Insoluble in water and alcohol.

Standard.—Lead carbonate, determined by the method of the British Pharmacopœia for Plumbi Monoxidum, contains not less than 79 per cent. of Pb; each millilitre of N/10 potassium permanganate is equivalent to 0·01036 gramme of Pb. The residue obtained on dissolving 1 gramme in 2 millilitres of nitric acid and 4 millilitres of water is not more than 1 per cent. (limit of insoluble matter). Dissolve 0·5 gramme in 4 millilitres of acetic acid, add 50 millilitres of water, completely precipitate the lead with hydrogen sulphide and filter; the residue obtained on evaporating the filtrate and igniting is not more than 0·01 gramme (limit of alkaline earths and alkalis).

Action and Uses.—Lead carbonate is used in the form of ointment as a mildly astringent and soothing application.

Preparation

Unguentum Plumbi Carbonatis, B.P.C.—(Ung. Plumb. Carb.)—Lead Carbonate Ointment. Lead carbonate, 10 per cent., in white paraffin ointment.

PLUMBI IODIDUM
(Plumb. Iod.)
Lead Iodide

$PbI_2 = 461·1$

Lead iodide may be prepared by the interaction of a soluble lead salt and potassium iodide. It occurs in the form of thin, shining, golden-yellow scales, or as a bright lemon-yellow, heavy, odourless powder, which is tasteless or has only a slight metallic taste. Aqueous

solutions are neutral to litmus. When heated it becomes red, then black, and, if air is excluded, it fuses and volatilises; in contact with air it melts, giving off iodine and leaving a yellow, crystalline mass of basic lead iodide. It is decomposed by light with liberation of iodine, especially in the presence of moisture, and should be **stored** protected from light.

Soluble in water (about 1 in 2000), boiling water (about 1 in 200); soluble in solutions of ammonium chloride and potassium iodide; very slightly soluble in alcohol.

Standard.—Lead iodide contains not less than 95 per cent. of PbI_2. 1 gramme warmed with 2 grammes of ammonium chloride and 15 millilitres of water forms a clear, colourless solution (limit of chromate and other insoluble foreign salts).

Assay.—Dissolve about 0·75 gramme, accurately weighed, in 45 millilitres of sodium hydroxide solution, using gentle heat if necessary; add 50 millilitres of N/10 silver nitrate, and acidify with dilute nitric acid; titrate with N/10 ammonium thiocyanate, using ferric ammonium sulphate solution as indicator; deduct the volume of N/10 silver nitrate required for the chloride present in 45 millilitres of the sodium hydroxide solution; each millilitre of N/10 silver nitrate is equivalent to 0·02305 gramme of PbI_2.

Action and Uses.—Lead iodide has been used externally in the form of Unguentum Plumbi Iodidi as a mild counter-irritant for application to swollen glands, and for chronic joint enlargements. It was formerly given internally in doses of 0·03 to 0·2 gramme ($\frac{1}{2}$ to 3 grains).

Preparation

Unguentum Plumbi Iodidi, B.P.C.—(Ung. Plumb. Iod.)—Lead Iodide Ointment. Lead iodide, 10 per cent, in benzoinated lard.

This ointment was included in the British Pharmacopœia, 1914.

PLUMBI MONOXIDUM

(Plumb. Monox.)

Lead Monoxide

PbO = 223·2

Synonyms—Plumbi Oxidum; Lead Oxide; Litharge.

Lead monoxide may be obtained by heating lead in air. At a moderate heat the oxide is obtained in the form of a yellow or pale orange powder; at a higher temperature the oxide melts and, on cooling, forms a scaly mass which may become brick-red in colour. Lead monoxide is amphoteric. It is very slightly **soluble** in water; the presence of a small quantity of saline matter in the water lessens the solubility, but

the presence of organic matter, especially sugar, increases it; the slight solubility in water is accompanied by the formation of lead hydroxide, which is faintly alkaline. It is insoluble in alcohol, but soluble in acetic and dilute nitric acids with formation of salts, and in hot solutions of alkali hydroxides forming plumbites.

Standard, B.P.—Lead monoxide contains not less than 99 per cent. of PbO, calculated on the ignited substance. Loss on ignition, not more than 4 per cent.

Uses.—Lead monoxide is used in pharmacy principally in the preparation of Emplastrum Plumbi, and of the glycerin and aqueous solutions of lead subacetate.

PLUMBI OLEAS
(Plumb. Oleas)
Lead Oleate

Lead oleate may be prepared by warming 100 parts of oleic acid in a porcelain dish to about 60° to 65°, and adding a solution of 16 parts of sodium hydroxide dissolved in a mixture of 30 parts of alcohol and 90 parts of water, until the solution is only faintly alkaline to phenolphthalein. This soap is dissolved in about 2000 parts of water, and into it is poured, with constant stirring, a solution of 67 parts of lead acetate in about 800 parts of water. The resulting precipitate should settle rapidly, leaving a clear supernatant liquid. The precipitate is collected, well washed until all traces of the salt formed in the reaction have been removed, and dried by spreading on porous tiles or bibulous paper. It occurs as an unctuous, granular powder.

Soluble in alcohol, ether, oil of turpentine and benzene.

Action and Uses.—Lead oleate is soothing and mildly astringent when applied to inflamed and excoriated surfaces. For this purpose it is applied as Unguentum Plumbi Oleatis. Emplastrum Plumbi, spread on calico, is used to draw together the edges of wounds, and as a protective agent. Spread on chamois leather, it affords greater protection, and is used for corns, bunions and abraded surfaces.

Preparations

Emplastrum Plumbi, B.P.—(Emp. Plumb.)—Plaster of Lead. *Syn.*—Lead Plaster; Diachylon Plaster; Diachylon. It is prepared by boiling lead monoxide with olive oil and distilled water.

Unguentum Plumbi Oleatis, B.P.C.—(Ung. Plumb. Oleat.)—Lead Oleate Ointment. *Syn.*—Unguentum Diachylon; Diachylon Ointment; Hebra's Ointment. Plaster of lead, 50 per cent., with oil of lavender and olive oil.

PODOPHYLLI RESINA
(Podoph. Res.)
Resin of Podophyllum

Synonyms—Podophyllum Resin; Podophyllin.

Resin of podophyllum is a mixture of resins obtained from podophyllum or from Indian podophyllum. It may be extracted by percolating with alcohol and pouring the concentrated percolate into water acidified with hydrochloric acid. The precipitated resin is well washed, and dried at a low temperature. The resin has an extremely irritating effect on the eyes and should be handled with care. It should be **stored** in well-closed containers and protected from light.

Resin of podophyllum occurs as a pale yellow or yellowish-brown, amorphous powder or in brownish-grey masses, having a characteristic odour and a bitter, acrid taste. It darkens in colour on exposure to light or when heated above 25°. The resin from podophyllum (*Podophyllum peltatum*) may be distinguished from that of Indian podophyllum (*P. emodi*) by gently shaking 0·5 millilitre of N/1 potassium hydroxide solution with 3 millilitres of a 13 per cent. w/v solution of the finely powdered resin in alcohol (60 per cent.); resin of podophyllum does not gelatinise, while resin of Indian podophyllum forms a stiff jelly.

Resin of podophyllum **contains** podophyllotoxin (varying from 20 per cent. in the case of resin from podophyllum, and at least 40 per cent. in resin from Indian podophyllum), podophylloresin, the yellow pigment, quercetin, and ill-defined resinous substances. Picropodophyllin is not naturally present in the resin, but is an isomeride of podophyllotoxin formed by the action of alkali upon the latter.

Soluble completely, or almost completely, in alcohol (90 per cent.); insoluble in cold water, partly soluble in hot water but precipitated again on cooling; partly soluble in ether, chloroform and dilute solution of ammonia.

Standard, B.P.—Resin of podophyllum loses, on drying at 100°, not more than 5 per cent. of its weight. Ash, not more than 1 per cent. Matter insoluble in dilute solution of ammonia, not more than 10 per cent. in the case of the resin from podophyllum, and not more than 50 per cent. in the case of the resin from Indian podophyllum.

Action and Uses.—Resin of podophyllum is a drastic but slowly acting purgative. Large doses may cause acute irritation of the stomach and intestines, with violent peristaltic contractions. It is employed in cases of habitual constipation associated with hepatic derangement. It is usually **administered** in pills with extract of hyoscyamus or belladonna to prevent griping, and is often given with nux vomica, aloes, colocynth, or rhubarb. Tinctura Podophylli may be given in mixture form with the tinctures of nux vomica and euonymus, the resin being suspended with a little mucilage of acacia, or it may be prescribed with aromatic spirit of ammonia, when the resin is held in solution.

Tinctura Podophylli Ammoniata has the advantage of miscibility with water without precipitation. Liquid preparations of podophyllum are, however, acrid and disagreeable.

Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

Preparations

Pilulæ Aloini et Podophyllini Compositæ, B.P.C.—(Pil. Aloin. et Podoph. Co.)—Compound Aloin and Podophyllin Pills. Each pill contains $\frac{1}{10}$ grain each of aloin and jalap resin, $\frac{1}{10}$ grain of oleoresin of capsicum, $\frac{1}{20}$ grain each of the dry extracts of nux vomica and hyoscyamus, and about ⅛ grain of resin of podophyllum. Dose.– 1 to 4 pills.

Pilulæ Podophyllini, Belladonnæ et Nucis Vomicæ, B.P.C.—(Pil. Podoph. Bellad. et Nuc. Vom.)—Podophyllin, Belladonna and Nux Vomica Pills. Each pill contains ½ grain each of resin of podophyllum, dry extract of belladonna and dry extract of nux vomica, and 1 grain of aloes. Dose.– 1 or 2 pills.

Pilulæ Podophyllini Compositæ, B.P.C.—(Pil. Podoph. Co.)—Compound Podophyllin Pills. Each pill contains ¼ grain of resin of podophyllum, 1 grain of mercurous chloride and ⅛ grain of dry extract of belladonna. Dose.– 1 pill.

Pilulæ Podophyllini et Quininæ, B.P.C.—(Pil. Podoph. et Quinin.)—Podophyllin and Quinine Pills. *Syn.*—Poore's Pills. Each pill contains $\frac{1}{12}$ grain of resin of podophyllum, 1 grain of quinine sulphate, ⅛ grain of dry extract of belladonna and 1 grain of aloes. Dose.– 1 pill.

Tinctura Podophylli, B.P.C.—(Tinct. Podoph.)—Tincture of Podophyllum. Resin of podophyllum, about 1 in 30. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This tincture was included in the British Pharmacopœia, 1914.

Tinctura Podophylli Ammoniata, B.P.C.—(Tinct. Podoph. Ammon.)—Ammoniated Tincture of Podophyllum. Resin of podophyllum, 1 in 50, in aromatic spirit of ammonia. Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

PODOPHYLLUM
(Podoph.)

Podophyllum

Synonyms—Podophylli Rhizoma; Podophyllum Rhizome; May Apple Root; American Mandrake.

Podophyllum consists of the dried rhizome and roots of *Podophyllum peltatum* Linn. (Fam. Berberidaceæ), a small herb with a long perennial rhizome, common in the Eastern United States of America and in Canada. The rhizome is collected in the late summer, cut into pieces and dried.

The rhizome occurs in sub-cylindrical pieces, about 5 to 10 or more centimetres in length and about 5 millimetres thick; externally it is reddish-brown, and smooth or slightly wrinkled longitudinally. At intervals of about 5 to 10 centimetres, the rhizome is enlarged for about 1 to 2 centimetres to a thickness of about 1·5 centimetres. On the upper surface of the enlargement is the concave scar, surrounded by several circular leaf-scars, left by the fall of the flowering stem. On the under surface of the enlargement are up to about 12 roots or root-scars. The roots, when present, are cylindrical or flattened in shape, about

1·5 millimetres thick, brown and brittle. The rhizome breaks with a short fracture. The smoothed, transversely cut surface is white and starchy, unless the rhizome has been dried at a temperature sufficient to gelatinise the starch, in which case it is yellowish and horny; it shows a thin cork and a circle of about 20 to 30 small, oval, vascular bundles situated about half-way between the centre and circumference of the rhizome. Podophyllum may be identified and distinguished from Indian podophyllum by macerating the powdered drug in 20 parts of alcohol (90 per cent.) for ten minutes, and filtering; the filtrate gives a bright green colouration, but no brown precipitate, on the addition of a few drops of strong solution of copper acetate. The acid-insoluble ash is about 1 to 2·5 per cent., and the total ash about 4 to 7 per cent. It yields to alcohol (90 per cent.) from 11 to 16 per cent. of extractive. The drug has a slight, characteristic odour and a somewhat bitter and acrid taste.

The diagnostic **microscopical** characters are the epidermal cells, containing reddish-brown contents, those of the cylindrical portion being from four to eight times as long as they are wide, and sub-rectangular in shape, and those of the enlarged regions being more nearly isodiametric; the cluster-crystals of calcium oxalate, often more than 60 microns in diameter; the usually cylindrical sclerenchymatous cells.

Podophyllum **contains** a neutral, crystalline substance named podophyllotoxin (0·2 to 1 per cent.) and an amorphous resin, podophyllorcsin, both of which are purgative. The drug also contains quercetin and starch. Alkalis convert podophyllotoxin into the salt of an unstable, gelatinous acid, podophyllic acid, which readily loses water and furnishes crystalline picropodophyllin, which is isomeric with podophyllotoxin and is the lactone of podophyllic acid. The drug yields from 2 to 8 per cent. or more of resin of podophyllum.

Standard, B.P.—Podophyllum contains not more than 2 per cent. of other organic matter.

Podophyllum, in powder (Pulvis Podophylli : Pulv. Podoph.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Podophyllum is used almost entirely in the form of its resin.

Dose.– 0·12 to 0·6 gramme (2 to 10 grains).

PODOPHYLLUM INDICUM

(Podoph. Ind.)

Indian Podophyllum

Synonyms—Podophylli Indici Rhizoma; Indian Podophyllum Rhizome.

Indian podophyllum consists of the dried rhizome and roots of *Podophyllum emodi* Wall. (Fam. Berberidaceæ), a plant growing in

the temperate forests on the lower slopes of the Himalayas. The roots are mainly detached, and form a large proportion of the drug.

The rhizome occurs in irregularly cylindrical or dorsiventrally flattened, contorted, knotty pieces, yellowish-brown to earthy-brown in colour. The pieces are about 2 to 4 centimetres long and 1 to 2 centimetres thick. On the upper surface are about 3 to 4 cup-shaped scars of aerial stems; on the under surface are numerous stout roots or circular root-scars. The rhizome breaks with a short fracture. The smoothed, transversely cut surface is pale brown and starchy, unless the temperature at which the rhizome has been dried has been sufficient to gelatinise the starch, in which case it is horny. It shows a large central pith, and a circle of about 20 radially elongated vascular bundles. Indian podophyllum may be identified and distinguished from podophyllum by macerating the powdered drug in 20 parts of alcohol (90 per cent.), and filtering; the filtrate gives a brown precipitate, but no green colouration, on the addition of a few drops of strong solution of copper acetate. The drug has a slight, characteristic odour and a somewhat bitter and acrid taste.

The diagnostic **microscopical** characters are the thin-walled, isodiametric cork cells; the occasional cluster-crystals of calcium oxalate, rarely exceeding 60 microns in diameter; the numerous, short, contorted sclerenchymatous cells; the absence of epidermal cells.

Indian podophyllum **contains** podophyllotoxin (1 to 4 per cent.) and podophylloresin. The drug yields from 6 to 12 per cent. of resin of podophyllum, which is not identical with that from podophyllum.

Standard, B.P.—Indian podophyllum contains not more than 2 per cent. of foreign organic matter.

Indian Podophyllum, in powder (Pulvis Podophylli Indici : Pulv. Podoph. Ind.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Indian podophyllum is used as a source of podophyllum resin. Tinctura Podophylli Indici, prepared with 3·65 per cent. w/v of the resin of Indian podophyllum and alcohol (90 per cent.), has been administered in doses of 0·3 to 1 millilitre (5 to 15 minims).

Dose.– 0·12 to 0·6 gramme (2 to 10 grains).

POTASSA SULPHURATA

(Potass. Sulphur.)

Sulphurated Potash

Synonym—Liver of Sulphur.

Sulphurated potash is a mixture of potassium polysulphides and other potassium compounds, including sulphite and thiosulphate, prepared by fusing 2 parts of potassium carbonate with 1 part of

sublimed sulphur. It occurs in the form of hard, solid fragments, greenish-yellow externally, pale liver-brown internally, the fractured surface rapidly changing to greenish-yellow on exposure to air. It has an odour of hydrogen sulphide and an acrid, alkaline taste. It readily absorbs moisture and carbon dioxide from the air, and undergoes oxidation. The aqueous solution is yellow and opalescent, and deposits, on standing, only a trace of insoluble matter; it is readily decomposed by acids with evolution of hydrogen sulphide and deposition of sulphur; when the solution is boiled with excess of hydrochloric acid and filtered, the filtrate responds to the tests for potassium. Sulphurated potash should be **stored** in well-closed containers.

Soluble in water (1 in 2).

Standard, B.P.—Sulphurated potash contains not less than 42 per cent. and not more than 45 per cent. of total sulphur.

Action and Uses.—Sulphurated potash is employed as a parasiticide, for "sulphur baths," in rheumatism, and as a stimulant to the skin in chronic cutaneous diseases. When applied to the skin, it dissolves the epidermis and hair. After absorption it may lead to the formation of sulph-hæmoglobin. Sulphides are mainly excreted as sulphate. Lotions of sulphurated potash are used in acne, eczema, etc., and sulphurated potash is also prescribed with zinc sulphate as a lotion for skin diseases. Unguentum Potassii Polysulphidi is used in the treatment of scabies, two applications generally being sufficient. Sulphur baths are used for the same purpose. For veterinary purposes, baths containing 2 ounces in 1 pint of water are used in the treatment of mange in dogs. Sulphurated potash is **incompatible** with acids.

Preparations

Lotio Potassæ Sulphuratæ, B.P.C.—(Lot. Potass. Sulphurat.)—Lotion of Sulphurated Potash. *Syn.*—Lotio Zinci Sulphidi. Each fluid ounce contains zinc sulphide, prepared from 10 grains of sulphurated potash and 10 grains of zinc sulphate, in rose water.

Sal Aperiens Sulphuratum, B.P.C.—(Sal Aper. Sulphurat.)—Sulphurated Aperient Salt. *Syn.*—Harrogate Salts. Sulphurated potash, 3 per cent., and potassium acid tartrate, 15 per cent., with exsiccated magnesium sulphate. Dose.—4 to 8 grammes (1 to 2 drachms).

Unguentum Potassii Polysulphidi, B.P.C.—(Ung Potass. Polysulph.)—Potassium Polysulphide Ointment. *Syn.*—Marcussen's Ointment; Danish Ointment. It contains polysulphides of potassium equivalent to 12·5 per cent. of sublimed sulphur, with zinc hydroxide and benzaldehyde, in wool fat, yellow soft paraffin and liquid paraffin.

POTASSII ACETAS

(Pot. Acet.)

Potassium Acetate

$C_2H_3O_2K = 98{\cdot}12$

Potassium acetate, $CH_3{\cdot}COOK$, may be obtained by the interaction of acetic acid and potassium carbonate, the product being fused to

remove moisture. It occurs as a white powder, or in granules, or in white, foliaceous, crystalline masses, having a satin-like lustre. The salt is odourless or has a faint, acetous odour, and a sharp, saline taste. It is very deliquescent, and the aqueous solution has an alkaline reaction to litmus. When heated to about 292° it fuses, and at a higher temperature it chars and decomposes with evolution of vapours having an empyreumatic odour. On ignition, it leaves a residue of potassium carbonate. It should be **stored** in well-closed, glass-stoppered containers.

Soluble in water (2 in 1) and alcohol (90 per cent.) (1 in 2).

Standard, B.P.—Potassium acetate contains not less than 99 per cent. of $C_2H_3O_2K$, calculated on the substance dried at 100°. Loss on drying at 100°, not more than 5 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for alkalinity, aluminium and calcium, chloride and sulphate.

Action and Uses.—Potassium acetate is rapidly absorbed and excreted, and is employed as a diuretic in dropsical conditions, especially of renal origin, and in febrile diseases. It decreases the acidity of the urine, being excreted as carbonate. It is best **administered** in dilute aqueous solution, its saline taste being disguised with syrup of orange. It is often given with infusion of buchu or scoparium, or as Mistura Potassii Acetatis Composita. Potassium acetate is added to solutions for hardening and preserving tissues in order to preserve their natural colour. Kaiserling's solutions contain:—(No. 1) Potassium nitrate, 10; potassium acetate, 30; solution of formaldehyde, 750; water, 1000. (No. 2) Potassium acetate, 50; glycerin, 100; water, 500. The material is steeped in No. 1 solution for four or five weeks, placed in alcohol for an hour or so until the original colour returns, and then kept in solution No. 2.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

Preparation

Mistura Potassii Acetatis Composita, B.P.C.—(Mist. Pot. Acet. Co.)—Compound Potassium Acetate Mixture. *Syn.*—Mistura Diuretica. Each fluid ounce contains 20 grains of potassium acetate, 30 minims of spirit of nitrous ether, 20 minims of tincture of hyoscyamus and 60 minims of juice of scoparium, with infusion of buchu. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

POTASSII BICARBONAS

(Pot. Bicarb.)

Potassium Bicarbonate

$KHCO_3 = 100{\cdot}1$

Potassium bicarbonate, or potassium hydrogen carbonate, may be prepared by saturating a strong aqueous solution of potassium carbonate with carbon dioxide. It occurs as colourless, odourless, monoclinic

prisms, or as a white, granular powder, with a saline, feebly alkaline taste. The aqueous solution rapidly loses carbon dioxide when heated, but the salt is not easily converted completely into carbonate. Potassium bicarbonate is completely converted into the carbonate when exposed for a short time to a low red heat.

Soluble in water (1 in 4); almost insoluble in alcohol (90 per cent.)

Standard, B.P.—Potassium bicarbonate contains not less than 99 per cent. and not more than the equivalent of 100·5 per cent. of $KHCO_3$. Arsenic limit, 2 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for aluminium, calcium and insoluble matter, carbonate, chloride, sulphate and iron.

Action and Uses.—Potassium salts taken by the mouth have very little action attributable to the K ion, since the latter is rapidly excreted. They are usually more irritant to the stomach than sodium salts, and exert a more marked diuretic action. Injected subcutaneously or intravenously, potassium salts act as a powerful poison to the heart and nervous system. Potassium bicarbonate neutralises gastric hyperacidity; for this purpose it is taken twenty to thirty minutes after a meal. For its action after absorption, potassium bicarbonate is used to reduce the acidity of the urine, to maintain the alkali reserve of the blood and to prevent acidosis. It is used with expectorants, in the treatment of bronchial catarrh and bronchitis, to render the mucous secretion more fluid and more easily removable. It is valuable in acute catarrhal conditions of the bladder and urethra, and in the acute stage of gonorrhœa. Potassium bicarbonate is **administered** in aqueous solution. For neutralisation, 20 parts of potassium bicarbonate require about 14 parts of citric acid, or 15 parts of tartaric acid.

Dose.– 1 to 4 grammes ($\frac{1}{4}$ to 1 drachm).

POTASSII BROMIDUM
(Pot. Brom.)

Potassium Bromide

KBr = 119·0

Potassium bromide may be prepared by the interaction of potassium carbonate and iron bromide obtained by the direct combination of iron and bromine in the presence of water. It is also obtained by adding a slight excess of bromine to a hot, strong solution of potassium hydroxide, evaporating the solution of potassium bromide and bromate to dryness, and decomposing the bromate by heating with charcoal, the bromide being purified by crystallisation. It occurs in colourless or white, odourless, cubical crystals, or as a white, granular powder, with a strongly saline taste.

Soluble in water (1 in 2), boiling water (1 in 1), alcohol (90 per cent.) (1 in 200), boiling alcohol (90 per cent.) (1 in 17) and glycerin.

Standard, B.P.—Potassium bromide contains not less than 99 per cent. of KBr, calculated on the substance dried at 110°. Loss on drying at 110°, not more than 1 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for free alkali, bromate, barium, chloride, sulphate and iron.

Action and Uses.—Potassium bromide is used for its action on the central nervous system. It depresses the psychical functions, the motor area, the medulla and cord. This effect is produced by a direct action of the drug on the nerve cells. By lowering the activity of both motor and sensory cells, the bromides are of great service in controlling epilepsy, and in the treatment of cerebral excitement. Through their influence on the medulla and cord they produce a general diminution of all the reflexes, and promote sleep by rendering the brain less sensitive to disturbing influences. From their effect on the pelvic centres of the cord, the bromides are powerful sexual sedatives and anaphrodisiacs. From the continued use of large doses, symptoms of bromism may arise; these consist of nausea and vomiting, mental dullness and lapse of memory, general muscular weakness and reduction of sensibility throughout the body. Various forms of skin eruption may follow the use of the bromides; acne of the head and shoulders is the commonest form, but abscesses and erythematous rashes are sometimes seen. Small doses of arsenic are said to prevent these symptoms. Bromides are also employed in other affections of the central nervous system, as in chorea, dysmenorrhœa and some forms of hysteria. Potassium bromide is employed to induce sleep when sleeplessness is caused by anxiety or overwork; it is useless in sleeplessness from pain. It is used with success in sea-sickness, often in combination with chloral formamide, and also in the sickness of pregnancy. It is a useful sedative in alcoholism, whooping cough, spasmodic asthma and nervous headache. Potassium bromide is **administered** in solution, sometimes with chloral hydrate and soluble phenobarbitone. Tablets should be dissolved in water since, if swallowed whole, they frequently cause pain in the stomach during solution. It is **incompatible** with salts of mercury and silver, oxidising substances, and with Spiritus Ætheris Nitrosi.

Dose.– 0·3 to 2 grammes (5 to 30 grains).

Preparations

Elixir Valerianæ Compositum, B.P.C.—(Elix. Valerian. Co.)—Compound Elixir of Valerian. *Syn.*—Elixir Bromidi et Valerianæ Compositum; Compound Elixir of Bromide and Valerian. Each fluid ounce contains 7½ grains each of potassium bromide and chloral hydrate, and 15 minims of liquid extract of valerian, with oils of orange, lemon, coriander and anise, alcohol (90 per cent.), syrup and distilled water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Liquor Bromidi Compositus, B.P.C.—(Liq. Brom. Co.)—Compound Bromide Solution. *Syn.*—Liquor Bromochloral Compositus. Each fluid drachm contains 15 grains of chloral hydrate and 15 grains of potassium bromide, with extract of cannabis, liquid extract of hyoscyamus, tincture of orange, glycerin and distilled water. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Liquor Potassii Arsenatis et Bromidi, B.P.C.—(Liq. Pot. Arsen. et Brom.)—Solution of Potassium Arsenate and Bromide. *Syn.*—Liquor Arsenii Bromidi; Clemens' Solution. A solution containing potassium arsenate and potassium bromide, prepared from arsenic trioxide, 1 per cent. w/v, with potassium bicarbonate, bromine and distilled water. Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

Mistura Bromidi Composita, B.P.C.—(Mist. Brom. Co.)—Compound Mixture of Bromides. Each fluid ounce contains 10 grains each of the bromides of ammonium, potassium and sodium, with tincture of nux vomica and solution of carmine, glycerin and chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Syrupus Potassii Bromidi et Pilocarpinæ, B.P.C.—(Syr. Pot. Brom. et Pilocarp.)—Syrup of Potassium Bromide and Pilocarpine. Potassium bromide, 10 per cent. w/v, and pilocarpine hydrobromide, 0·005 per cent. w/v, with glycerin and syrup of orange; each fluid drachm contains about 5½ grains of potassium bromide and $\frac{1}{200}$ grain of pilocarpine hydrobromide. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

POTASSII CARBONAS
(Pot. Carb.)

Potassium Carbonate

Synonym—Salt of Tartar.

Potassium carbonate was formerly obtained from wood ashes in countries where wood was plentiful. It is now largely obtained from potassium chloride, occurring in natural deposits in Europe and America, by passing carbon dioxide into a solution of the chloride in the presence of hydrated magnesium carbonate. A sparingly soluble double salt of magnesium carbonate and potassium bicarbonate is precipitated and, after separation, is decomposed by treatment with magnesium oxide, when a solution of potassium carbonate is obtained. Potassium carbonate is also obtained by heating the bicarbonate obtained by passing carbon dioxide into a solution of potassium hydroxide prepared by the electrolysis of potassium chloride solution. The salt approximates to the formula, K_2CO_3,H_2O, and occurs as an odourless, very deliquescent, white, crystalline powder, with a strongly alkaline taste. When heated between 200° and 300° it becomes anhydrous; at a bright red heat it fuses and at a white heat it volatilises. It should be **stored** in well-closed containers. "Pearl-ash" and "American potash" are forms of crude potassium carbonate.

Soluble in water (1 in 1); insoluble in alcohol.

Standard, B.P.—Potassium carbonate contains not less than 99 per cent. of K_2CO_3, calculated on the substance dried between 200° and 300°. Loss on drying between 200° and 300°, not less than 14 per cent. and not more than 18 per cent. Arsenic limit, 2 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for aluminium, calcium, insoluble matter, chloride, sulphate and iron.

Action and Uses.—The properties of potassium carbonate resemble those of potassium bicarbonate, but it is more caustic and irritating, and is rarely given internally. It is sometimes applied externally as a lotion in eczema and urticaria (30 grains to 1 pint).

Dose.—0·12 to 0·3 gramme (2 to 5 grains).

POTASSII CHLORAS

(Pot. Chloras)

Potassium Chlorate

$KClO_3 = 122·6$

Potassium chlorate is usually obtained by the electrolysis of a hot aqueous solution of potassium chloride, when the chloride is oxidised at the anode to the chlorate. It occurs in colourless crystals or as a white powder, having a cool, saline taste. When heated to about 370°, it melts and evolves oxygen, leaving a residue of potassium chloride and potassium perchlorate. When treated with hydrochloric acid, the liquid becomes yellow and a mixture of chlorine and chlorine peroxide is evolved. Potassium chlorate is permanent in air, but is liable to explode in contact with readily oxidisable substances such as phosphorus, sulphur, or organic compounds, especially if triturated or subjected to percussion.

Soluble in water (about 1 in 16), boiling water (about 1 in 2), alcohol (60 per cent.) (about 1 in 152) and glycerin (about 1 in 30); almost insoluble in alcohol (90 per cent.).

Standard, B.P.—Potassium chlorate contains not less than 99 per cent. of $KClO_3$. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for chloride and sulphate.

Action and Uses.—Potassium chlorate is rapidly absorbed, and is continuously eliminated by the salivary glands, mucous membranes, and kidneys. It is employed in foul conditions of the mouth and pharynx in the belief that putrefying organic matter is oxidised under such conditions. Large doses are actively poisonous; methæmoglobin is set free in the blood serum, the red corpuscles are disintegrated, and cyanosis results from deficient oxygenation of the blood, death occurring from respiratory failure; there may, however, be complete recovery from the acute symptoms, death occurring five or six weeks later from nephritis caused by blocking of the fine renal tubules with the disintregrated blood debris. The salt is used **internally,** but should be given only with care to young children, and never when there is renal disease. Potassium chlorate is used as a mouth-wash (1 in 40) when the gums are inflamed or spongy, for aphthous conditions, in tonsillitis, and in the stomatitis following the prolonged use of mercury. It is

administered in mixtures with dilute hydrochloric acid, or in alkaline mixtures with sodium salicylate. Lozenges, pastilles and tablets, with or without borax, are prepared. It is also used in gargles with borax, phenol, glycerin, or ferric chloride. Potassium chlorate is employed in the preparation of Gargarisma Chlori, which is used as a deodorant and for the treatment of septic throat. It is **incompatible** with sulphur, charcoal and other readily oxidisable substances, and, in mixing it with any dry substance, friction and percussion should be avoided. Tablets of potassium chlorate should not be allowed to come in contact with matches or surfaces containing phosphorus compounds. In cases of **poisoning** by potassium chlorate, the stomach should be evacuated and alkali bicarbonates administered.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

Preparations

Gargarisma Chlori, B.P.C.—(Garg. Chlor.)—Chlorine Gargle. A chlorinated solution prepared by dissolving in water the products of the interaction of potassium chlorate and hydrochloric acid. It should be diluted before use with one or more parts of water.

Gargarisma Potassii Chloratis, B.P.C.—(Garg. Pot. Chlorat.)—Potassium Chlorate Gargle. Potassium chlorate, about 1 in 40, in distilled water acidified with dilute hydrochloric acid.

Tabellæ Potassii Chloratis et Boracis, B.P.C.—(Tab. Pot. Chlorat. et Borac.)—Tablets of Potassium Chlorate and Borax. Each tablet contains 3 grains of potassium chlorate and 2 grains of borax. Dose.– 1 or 2 tablets.

Trochisci Potassii Chloratis, B.P.C.—(Troch. Pot. Chlorat.)—Potassium Chlorate Lozenges. Each lozenge contains 3 grains of potassium chlorate.

This lozenge, containing 0·2 gramme of potassium chlorate, was included in the British Pharmacopœia, 1914.

POTASSII CHLORIDUM

(Pot. Chlorid.)

Potassium Chloride

$KCl = 74·55$

Potassium chloride is obtained from natural deposits, chiefly from carnallite, a double chloride of potassium and magnesium. It may also be prepared by treating a solution of potassium carbonate with hydrochloric acid until only faintly acid, filtering, evaporating, and drying the salt at 105°. Potassium chloride occurs as colourless, odourless, cubical crystals or quandrangular prisms, or as a crystalline powder, having a saline and slightly bitter taste resembling that of table salt; it is anhydrous, and permanent in the air. It decrepitates when heated. In contact with a non-luminous flame it produces a violet-coloured flame without any tinge of yellow.

Soluble in water (1 in 3); insoluble in dehydrated alcohol and ether.

Standard.—Potassium chloride, determined by the method of the British Pharmacopœia for Sodii Chloridum, contains not less than 99·5 per cent. of KCl, calculated on the substance dried at 130°; each millilitre of N/10 silver nitrate is equivalent to 0·007455 gramme of KCl. Loss on drying at 130°, not more than 1·0 per cent. The aqueous solution (1 in 10) is neutral to litmus. Arsenic limit, 1 part per million. Lead limit, 5 parts per million. It complies with the limit tests for sulphates, iron, bromides and iodides, barium, and calcium and magnesium in Sodii Chloridum.

Action and Uses.—Potassium chloride does not exhibit the depressant action of the K ion on the tissues, because it is excreted with such extreme rapidity that the blood never contains it in sufficient concentration to produce the specific effect. It has been recommended for use as a table salt in place of sodium chloride for gouty and rheumatic patients, as a means of retarding the formation of biurates in the tissues. A mixture composed of potassium chloride, 16 parts, sodium chloride, 8 parts, and lithium benzoate, 1 part, has also been recommended for the same purpose.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

POTASSII CITRAS

(Pot. Cit.)

Potassium Citrate

$C_6H_5O_7K_3,H_2O = 324·3$

Potassium citrate, $COOK·C(OH)(CH_2·COOK)_2,H_2O$, may be prepared by neutralising citric acid with potassium carbonate. It occurs as an odourless, white, granular or crystalline powder, with a cooling, saline taste. The aqueous solution is alkaline to litmus but not to phenolphthalein. Potassium citrate is slightly deliquescent in moist air. It should be **stored** in well-closed containers.

Soluble in water (1 in 1), glycerin (1 in 2) and alcohol (60 per cent.) (1 in 9); almost insoluble in alcohol (90 per cent.).

Standard, B.P.—Potassium citrate contains not less than 99 per cent. of $C_6H_5O_7K_3,H_2O$. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for alkalinity or acidity, tartrate, oxalate, chloride and sulphate.

Action and Uses.—Potassium citrate, when taken internally, is partly absorbed and oxidised in the tissues to alkali carbonate, in which form it is excreted. It therefore renders the blood and urine more alkaline, having the remote effect of the bicarbonates without their neutralising action upon gastric secretion. As the alkali citrates are absorbed more readily than the tartrates, their laxative action is

less marked. Potassium citrate is employed principally to increase the quantity of urine and render it alkaline in gout and rheumatism, in catarrhal conditions of the bladder and urethra, and as a mild diaphoretic and febrifuge in feverish conditions. It is employed as a prophylactic against post-scarlatinal nephritis and in the treatment of acute nephritis, and in large doses in the acid intoxication of diabetes; it is a useful expectorant in the early stages of bronchitis. It is **administered** in mixtures, and Potassii Citras Effervescens is a convenient antacid for daily use by gouty and rheumatic subjects.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

Preparations

Mistura Ammonii Acetatis Composita, B.P.C.—(Mist. Ammon. Acet. Co.)—Compound Ammonium Acetate Mixture. *Syn.*—Mistura Diaphoretica. Each fluid ounce contains 20 grains of potassium citrate and 20 minims each of strong solution of ammonium acetate, spirit of nitrous ether and spirit of chloroform, in camphor water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Potassii Citras Effervescens, B.P.C.—(Pot. Cit. Efferv.)—Effervescent Potassium Citrate. About 1 in 6. Dose.– 4 to 8 grammes (1 to 2 drachms).

POTASSII CYANIDUM

(Pot. Cyanid.)

Potassium Cyanide

KCN = 65·10

Potassium cyanide may be prepared by heating potassium ferrocyanide to bright redness, when the products are potassium cyanide, iron, carbon and nitrogen, or with potassium carbonate, when potassium cyanide, potassium cyanate, carbon dioxide and iron are formed. The so-called "double salt" may be obtained by fusing the ferrocyanide with metallic sodium, when a mixture of potassium cyanide and sodium cyanide in the proportion of 2 to 1 is obtained. Pure potassium cyanide may be obtained by Beilby's process, in which a mixture of fused potassium carbonate and carbon is treated with ammonia gas, the only by-product being water. The alkali cyanides are now manufactured synthetically, principally from sodamide or from calcium cyanamide.

Potassium cyanide occurs in the form of white, cubical crystals, or in white, opaque, fused masses, and it is sometimes fused into sticks. It is deliquescent, and has the odour of hydrocyanic acid. The aqueous solution is strongly alkaline to litmus, and dissolves iron, zinc, copper and nickel with evolution of hydrogen; in the presence of oxygen it dissolves silver and gold, but for the extraction of gold, sodium cyanide is exclusively used. The aqueous solution is decomposed on exposure to air, absorbing carbon dioxide; on boiling, it is partly decomposed, yielding

ammonia and potassium formate. Potassium cyanide fuses at a dull red heat, and, in the absence of moisture, volatilises unchanged at a full red heat. When heated with a metallic oxide, it gives potassium cyanate and the metal, thus acting as an energetic reducing agent. When fused with sulphur, it yields potassium thiocyanate, and when heated with potassium chlorate or nitrate, it explodes violently.

Commercial fused potassium cyanide occurs in various strengths (equivalent to 30, 40, and 90 to 95 per cent. of KCN), but it is easily obtained of 96 per cent. strength. The so-called "double salt," containing sodium and potassium cyanides equivalent to 98 to 100 per cent. of KCN, is the cheapest product, and serves most of the purposes for which potassium cyanide is required. Sodium cyanide which contains cyanogen equivalent to about 130 per cent. of KCN is also obtainable. Potassium cyanide should be **stored** in well-closed containers. It is intensely poisonous, and great caution should be observed in handling it.

Soluble in water (1 in 2·5), alcohol (almost entirely, 1 in 100), boiling alcohol (1 in 80) and in weaker alcohol, in larger proportion.

Uses.—Potassium cyanide is very rarely **administered** internally. It is employed by entomologists for killing insects without injury. For this purpose the salt is usually broken into small pieces, and a layer, three-quarters to one inch deep, is placed at the bottom of a wide-mouthed bottle provided with a well-fitting cork; plaster of Paris cream is poured over the cyanide to form a level floor, and allowed to set; the bottle is constantly filled with a poisonous vapour. Potassium cyanide removes the stain of silver nitrate from the skin. In cases of **poisoning** by potassium cyanide, large draughts of ferrous sulphate and water should be given at once, followed immediately by solution of sodium carbonate or magnesia, and by an emetic or the use of the stomach pump. Stimulants and artificial respiration should be used.

POTASSII FERRICYANIDUM.—Potassium ferricyanide, $K_3Fe(CN)_6$, occurs as red crystals. It is used largely in photography and as a reagent.

POTASSII FERROCYANIDUM.—Potassium ferrocyanide, $K_4Fe(CN)_6,3H_2O$, occurs as odourless, translucent, soft, lemon-yellow tablets or prisms. It is used as a reagent.

SODII NITROPRUSSIDUM.—Sodium nitroprusside, $Na_2Fe(CN)_5NO,2H_2O$, occurs as large, ruby-red, non-deliquescent crystals, which are not dehydrated at 100°. The aqueous solution decomposes rapidly in sunlight or on heating, with precipitation of prussian blue. It is used largely as a reagent for acetone in urine. A few drops of saturated solution are added to a small quantity of the urine and solution of ammonia is floated on the mixture; a magenta-coloured ring is produced. It is also used to detect soluble sulphides with which it gives a deep purple colour.

SODII THIOCYANAS—Sodium thiocyanate, sulphocyanide, or rhodanide, occurs as colourless crystals, readily soluble in water. It has been administered in the form of a solution in doses of 0·12 gramme (2 grains), thrice daily, for reducing arterial hypertension. The dose may be increased gradually up to 1 gramme (15 grains) a day.

POTASSII DICHROMAS

(Pot. Dichrom.)

Potassium Dichromate

$K_2Cr_2O_7 = 294{\cdot}2$

Synonym—Potassium Bichromate.

Potassium dichromate may be obtained by roasting chrome ironstone with lime in the presence of air, treating the resulting chromate with a potassium salt and, subsequently, with an acid. It occurs in large, orange-red, transparent, triclinic, odourless prisms, having an acid, metallic taste. The aqueous solution is acid to litmus. The salt melts unchanged below a dull red heat, but at higher temperatures it is decomposed, yielding chromium oxide, potassium chromate and oxygen. 1 gramme dissolved in 20 millilitres of water and 5 millilitres of hydrochloric acid forms, on the gradual addition of 1 millilitre of alcohol, a green solution.

Soluble in water (1 in 10), boiling water (1 in 1·2); insoluble in alcohol.

Standard.—Potassium dichromate contains not less than 99 per cent. of $K_2Cr_2O_7$. 2 grammes complies with the limit test for chlorides. 1 gramme complies with the limit test for sulphates. 2 grammes dissolved in 20 millilitres of water shows no turbidity on making distinctly alkaline with solution of ammonia and adding ammonium oxalate solution (limit of aluminium and calcium).

Assay.—Dissolve about 0·15 gramme, accurately weighed, in 25 millilitres of water in a glass-stoppered flask; add 2 grammes of potassium iodide, dilute to about 250 millilitres, add 5 millilitres of hydrochloric acid, and allow to stand for about 10 minutes; titrate the liberated iodine with N/10 sodium thiosulphate, using starch mucilage as indicator; each millilitre of N/10 sodium thiosulphate is equivalent to 0·004904 gramme of $K_2Cr_2O_7$.

Action and Uses.—Potassium dichromate has been used in the form of pills, prepared by triturating the salt with kaolin and massing with kaolin ointment or wool fat, in the treatment of gastric ulcer. It is **incompatible** with alcohol and all reducing agents. In cases of poisoning by potassium dichromate, the stomach pump or an emetic of zinc sulphate or mustard should be used, followed by chalk or white of egg in milk, and barley water. A solution of potassium dichromate, 2·5 parts, and sodium sulphate, 1 part, in water, 100 parts, is known as Müller's fluid, and is used for hardening tissues, post mortem, prior to histological examination.

Dose.—0·006 to 0·012 gramme ($\frac{1}{10}$ to $\frac{1}{5}$ grain).

POTASSII CHROMAS.—Potassium chromate, K_2CrO_4, may be prepared by the interaction of aqueous solutions of potassium dichromate and potassium hydroxide and occurs in lemon-yellow crystals. It is soluble in water, but insoluble in alcohol.

POTASSII FORMAS
(Pot. Form.)

Potassium Formate

$CHO_2K = 84{\cdot}10$

Potassium formate, H·COOK, may be prepared by saturating an aqueous solution of formic acid with potassium carbonate or hydroxide, and evaporating. The solution crystallises with difficulty. Potassium formate occurs in the form of anhydrous, deliquescent, transparent, cubical crystals, or as a crystalline powder, having a bitter, saline taste.

Very **soluble** in water (3 in 1); less soluble in alcohol; insoluble in ether.

Standard.—Potassium formate, determined by the method for Calcii Formas, contains not less than 95 per cent. of CHO_2K; each millilitre of N/10 potassium permanganate is equivalent to 0·004205 gramme of CHO_2K. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million.

Action and Uses.—Potassium formate resembles, in its action, the formates of sodium and calcium. It is **administered** in solution in mixture form; Elixir Formatum Compositum is a palatable preparation of the formates.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

Preparation

Elixir Formatum Compositum, B.P.C.—(Elix. Form. Co.)—Compound Elixir of Formates. *Syn.*—Elixir Formatum cum Strychnina; Elixir of Formates with Strychnine. Each fluid drachm contains about 3 grains each of sodium formate and potassium formate, and 1¼ minims of solution of strychnine hydrochloride, with simple elixir. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

POTASSII GLYCEROPHOSPHAS LIQUIDUS
(Pot. Glycerophosph. Liq.)

Solution of Potassium Glycerophosphate

Solution of potassium glycerophosphate is an aqueous solution containing about 50 per cent. of the neutral potassium salts of α- and β-glycerophosphoric acids, and may be prepared by the interaction of potassium carbonate and glycerophosphoric acid. It occurs as a colourless or not more than faintly yellow, syrupy liquid. A solution containing 75 per cent. is also found in commerce; it occurs as a thick, syrupy liquid, often partly crystallised.

Miscible in all proportions with water.

Standard.—Solution of potassium glycerophosphate, determined by the method for Sodii Glycerophosphas Liquidus, contains not less than 48 and not more than 52 per cent. by weight of $C_3H_7O_6PK_2,3H_2O$;

each millilitre of N/1 hydrochloric acid is equivalent to 0·3023 gramme of $C_3H_7O_6PK_2,3H_2O$. Specific gravity, 1·38 to 1·42. Arsenic limit, 2·5 parts per million. Lead limit, 10 parts per million. Mix 5 grammes in a stoppered cylinder with 20 millilitres of dehydrated alcohol, add 5 grammes of recently ignited calcium sulphate, shake until the supernatant liquid is practically clear, filter into a 100 millilitre beaker, wash the residue in a cylinder with a few millilitres of dehydrated alcohol, evaporate the filtrate and washings, dry the residue at 70° for one hour, and weigh; the residue weighs not more than 0·10 gramme (limit of free glycerin). Limit of free alkali (calculated as K_2CO_3), 0·5 per cent. Limit of free phosphate (calculated as P_2O_5), 0·5 per cent.

Action and Uses.—Potassium glycerophosphate resembles, in its action, sodium and calcium glycerophosphates (see Acidum Glycerophosphoricum). It is given with other glycerophosphates in the form of Glycerinum Glycerophosphatum Compositum, Syrupus Glycerophosphatum Compositus, or other compound syrups.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

POTASSII GUAIACOLSULPHONAS

(Pot. Guaiacolsulph.)

Potassium Guaiacolsulphonate

$C_7H_7O_5SK = 242·2$

Potassium guaiacolsulphonate, $C_6H_3(OCH_3)(OH)SO_3K$ (1 : 2 : 3), is the potassium salt of guaiacolsulphonic acid, obtained by the action of sulphuric acid on guaiacol at 70° to 80°, converting the guaiacolsulphonic acid produced into the barium salt, which is then decomposed by potassium sulphate to form potassium guaiacolsulphonate. It occurs as a white, odourless powder, having a taste at first bitter and afterwards sweet. The aqueous solution is slightly alkaline to litmus, and is not precipitated by barium chloride solution; with ferric chloride solution an intense violet-blue colour is produced, which disappears on the addition of ammonia or strong solutions of alkali sulphates or chlorides. On the addition of sulphuric acid and a trace of formaldehyde, a reddish-violet colour is obtained. On the addition of 1 millilitre of nitric acid to 10 millilitres of a warm 10 per cent. aqueous solution, the solution becomes deep red, and deposits yellow crystals on cooling; the filtrate remains red, and yields a white precipitate on the addition of barium nitrate solution.

Readily **soluble** in water; almost insoluble in alcohol; insoluble in dehydrated alcohol, ether and oils.

Standard.—Potassium guaiacolsulphonate yields not less than 35·2 per cent. of sulphated ash, equivalent to not less than 98 per cent. of $C_7H_7O_5SK$. Lead limit, 20 parts per million. 1 gramme complies with the limit test for sulphates.

Action and Uses.—Potassium guaiacolsulphonate is used in the treatment of phthisis, bronchitis, pneumonia and intestinal catarrh. It may be **administered** in cachets or tablets, or in mixtures flavoured with syrup of orange.

Dose.– 0·5 to 1 gramme (8 to 15 grains).

POTASSII HYDROXIDUM
(Pot. Hydrox.)

Potassium Hydroxide
KOH = 56·10

Synonyms—Potassa Caustica; Caustic Potash.

Potassium hydroxide is usually obtained by the electrolysis of an aqueous solution of potassium chloride. It occurs in white sticks, pellets, or fused masses, which are dry, hard and brittle, breaking with a crystalline fracture. It is powerfully alkaline and corrosive, and quickly destroys organic tissues. Exposed to the air, it rapidly absorbs moisture and carbon dioxide. The variety described as "purified by alcohol" was prepared by solution in alcohol, filtration to remove the less soluble carbonate and other salts, and evaporation to dryness. Potassium hydroxide should be **stored** in well-closed containers.

Soluble in water (1 in 0·95) and alcohol (90 per cent.) (1 in 3); very soluble in boiling dehydrated alcohol.

Standard, B.P.—Potassium hydroxide contains not less than 85 per cent. of total alkali, calculated as KOH. Arsenic limit, 5 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for carbonate, aluminium, iron and matter insoluble in hydrochloric acid, chloride and sulphate.

Action and Uses.—Potassium hydroxide is a powerful caustic, and has been used externally to destroy nævi and warts. A solution is used as a cuticle solvent. Liquor Potassii Hydroxidi, in doses of 0·6 to 2 millilitres (10 to 30 minims), freely diluted, is antacid and diuretic, but for internal use the bicarbonates are almost always superior. Vienna paste (Pasta Potassæ et Calcis) is a mixture of potassium hydroxide and calcium hydroxide made into a paste with alcohol or glycerin. In cases of **poisoning** by potassium hydroxide, large draughts of water containing vinegar, acetic acid, citric acid, or lemon juice should be given, followed by demulcent drinks and olive oil.

Preparations

Liquor Potassii Hydroxidi, B.P.—(Liq. Pot. Hydrox.)—Solution of Potassium Hydroxide. *Syn.*—Liquor Potassæ; Solution of Potash. An aqueous solution containing 5 per cent. w/v of total alkali, calculated as KOH (limits, 4·75 to 5·25). It should be stored in well-closed bottles of green glass. It is administered in doses of 0·6 to 2 millilitres (10 to 30 minims), freely diluted.

POTASSII HYDROXYQUINOLINI SULPHAS

(Pot. Hydroxyquinolin. Sulph.)

Potassium Hydroxyquinoline Sulphate

Synonym—Potassium Oxyquinoline Sulphate.

Potassium hydroxyquinoline sulphate approaches in composition to $C_9H_6(OH)N,HSO_4K$, and may be prepared by treating two molecular proportions of 8-hydroxyquinoline with one of potassium pyrosulphate in alcoholic solution. Some doubt exists concerning its constitution. It has been regarded also as a mixture of approximately equimolecular proportions of 8-hydroxyquinoline sulphate, $(C_9H_6(OH)N)_2,H_2SO_4$, and potassium sulphate, and as a mixture of 8-hydroxyquinoline and potassium acid sulphate. It occurs as a light yellow, microcrystalline powder. The aqueous solution is strongly acid in reaction (*p*H about 3·0). The aqueous solution, on the addition of ferric chloride solution, produces a bright green colouration; on the careful addition of alkali the base is precipitated, but redissolves in excess; on the addition of bromine a precipitate of a dibromohydroxyquinoline is obtained. The solution also yields precipitates with traces of salts of various heavy metals; one part of copper in a million is detectable. The reaction is due to the 8-hydroxyquinoline, which has been suggested also for use in the determination of magnesium and aluminium.

Soluble in water; sparingly soluble in alcohol; insoluble in ether.

Standard.—Potassium hydroxyquinoline sulphate partly liquefies between 172° and 178° (the melting-point of 8-hydroxyquinoline sulphate). Sulphated ash, not less than 30 and not more than 33 per cent.

Action and Uses.—Potassium hydroxyquinoline sulphate has antiseptic and deodorant properties. It is rarely employed internally. **Externally,** as a lotion or application to the skin in mycosis, eczema, etc., it is used in strengths of from 1 in 500 to 1 in 2000. A solution containing 15 grains to the pint is said to be equal in germicidal properties to a 1 in 40 solution of phenol. It has been used as a spermicide in the form of jelly, pessaries and tablets.

POTASSII HYPOPHOSPHIS

(Pot. Hypophosph.)

Potassium Hypophosphite

$KPH_2O_2 = 104·1$

Potassium hypophosphite may be prepared by interaction between potassium carbonate and calcium hypophosphite in aqueous solution. It occurs in odourless, very deliquescent, white, opaque, hexagonal plates, or crystalline masses, or more usually as a granular powder, having a pungent, saline and bitterish taste. The aqueous solution is

neutral or slightly alkaline to litmus. When heated, spontaneously inflammable hydrogen phosphide is evolved. It reduces silver nitrate, copper sulphate and mercuric chloride solutions. When triturated with nitrates, chlorates and other oxidising agents, explosions are liable to occur. Boiled with potassium hydroxide solution, hydrogen is given off and potassium phosphate and phosphite are formed. It is oxidised rapidly on evaporation with nitric acid.

Soluble in water (1 in 0·6), boiling water (1 in 0·3), alcohol (90 per cent.) (1 in 7·5) and boiling alcohol (90 per cent.) (1 in 3·5); insoluble in ether.

Standard.—Potassium hypophosphite, determined by the method for Calcii Hypophosphis, contains not less than 98 per cent. of KPH_2O_2, calculated on the substance dried over sulphuric acid; each millilitre of N/10 iodine is equivalent to 0·005207 gramme of KPH_2O_2. Loss on drying over sulphuric acid, not more than 2 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. It complies with the limit test for phosphate in Calcii Hypophosphis.

Action and Uses.—Potassium hypophosphite has the general properties of the hypophosphites (see Acidum Hypophosphorosum Dilutum). It is **administered** with other hypophosphites in the form of compound syrup of hypophosphites.

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

POTASSII IODIDUM

(Pot. Iod.)

Potassium Iodide

$KI = 166·0$

Potassium iodide may be prepared by the action of potassium carbonate on a solution of iron iodide prepared by the direct combination of iron and iodine in the presence of water. It may also be obtained by the action of excess of iodine on a warm solution of potassium hydroxide, the resulting solution of potassium iodide and iodate being evaporated to dryness, and the residue heated with charcoal to reduce the iodate to iodide, which is extracted with water and purified by crystallisation. It occurs in colourless, odourless, translucent or opaque crystals, or as a granular powder, having a slightly bitter, saline taste. The salt decrepitates on heating, fuses at a low red heat, and at a higher temperature it volatilises without decomposition. The aqueous solution has a faintly alkaline reaction; it readily dissolves iodine, forming a dark brown solution containing potassium triiodide, KI_3, which has been obtained in the form of black, acicular crystals; the aqueous solution also dissolves certain iodides insoluble in water, such as mercuric iodide, double iodides being formed.

Soluble in water (1 in 0·7), alcohol (90 per cent.) (1 in 12) and glycerin (1 in 2).

Standard, B.P.—Potassium iodide contains not less than 99 per cent. of KI, calculated on the substance dried at 110°. Loss on drying at 110°, not more than 1 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for free alkali, iodate, barium, cyanide and sulphate.

Action and Uses.—Potassium iodide increases the flow of bronchial secretion, and for this reason is used, often with tincture of stramonium, in some forms of asthma and chronic bronchial catarrh; it is rapidly excreted. Potassium iodide has no specific spirochæticidal action, but it aids the absorption of newly formed fibrous tissue, and to this property is attributed its value in the treatment of the later stages of syphilis—the resolution of the fibrous tissue allowing other remedies, which are usually administered with it, an opportunity to attack the spirochætes. For a similar reason it is employed in the treatment of actinomycosis. Potassium iodide is used in the treatment of aneurism and arteriosclerosis, and also in chronic rheumatism and allied fibrositic conditions. In cases of high arterial tension and angina pectoris it may help by relaxation of the arterioles. Potassium iodide is used in the treatment of goitre; it is used as a prophylactic in districts where the condition is endemic, but the administration is prolonged and overdosage must be avoided, since too great a quantity may result in a condition of hyperthyroidism. In the early treatment of exophthalmic goitre it may be useful, and may cause a sufficient remission of the symptoms to give operative treatment a better chance of success, but treatment beyond two or three weeks is not usually of any value, the symptoms tending to recur. Potassium iodide is given in cases of chronic lead and mercury poisoning. In the latter condition the doses should be small in order to avoid too rapid liberation of the metal from the tissues, with risk of acute symptoms. Intolerance to iodides sometimes occurs, the symptoms being nasal catarrh, lachrymation, skin rashes of a variable character, headache and depression. Some patients showing idiosyncrasy to small doses appear to tolerate larger doses. Potassium iodide should not be given in pulmonary tuberculosis.

It is best **administered** in solution freely diluted, since concentrated solutions have an irritant action on the gastric mucosa. When it is desired to give large doses of iodide, as in the treatment of actinomycosis, it is better to avoid the depressant action of the potassium ion by substituting the sodium salt. Potassium iodide has been employed as a test for renal function. 2 grammes of the salt is given, and the urinary elimination estimated; in twelve hours 60 to 80 per cent. is excreted by the normal kidneys. Externally, in the form of Linimentum Potassii Iodidi cum Sapone, it is used as a local application to enlarged glands. Potassium iodide is **incompatible** with spirit of nitrous ether, solutions of ferric salts, dilute nitro-hydrochloric acid, solution of strychnine hydrochloride, potassium chlorate and bismuth subnitrate.

Dose.– 0·3 to 2 grammes (5 to 30 grains).

Preparations

Linimentum Potassii Iodidi, B.P.C.—(Lin. Pot. Iod.)—Liniment of Potassium Iodide. A liquid preparation containing potassium iodide, 1 in 10, with soft soap, glycerin, oil of lemon and alcohol (60 per cent.).

Linimentum Potassii Iodidi cum Sapone, B.P.C.—(Lin. Pot. Iod. c. Sap.)—Liniment of Potassium Iodide with Soap. A solid preparation containing potassium iodide, about 1 in 7, with curd soap, glycerin, oil of lemon and distilled water.

This liniment was included in the British Pharmacopœia, 1914.

Unguentum Potassii Iodidi, B.P.C.—(Ung. Pot. Iod.)—Potassium Iodide Ointment. Potassium iodide, 10 per cent., with potassium carbonate and distilled water in benzoinated lard.

This ointment was included in the British Pharmacopœia, 1914.

POTASSII NITRAS

(Pot. Nitras)

Potassium Nitrate

$KNO_3 = 101{\cdot}1$

Synonyms—Nitre; Saltpetre.

Potassium nitrate occurs naturally in various hot countries, where it is obtained by lixiviation from certain soils containing nitrogenous excrements. It is also obtained by the interaction of hot, saturated solutions of sodium nitrate and potassium chloride; sodium chloride is precipitated, and the clear liquid deposits potassium nitrate on cooling. Potassium nitrate occurs as a white, crystalline powder or as colourless crystals; it is odourless, and has a cooling, saline taste. The aqueous solution is neutral to litmus. When heated to about 353°, the salt melts and forms, on cooling, a solid mass known as "sal prunella," usually supplied in the form of small balls; at a higher temperature it is decomposed, giving off oxygen and then some of its nitrogen, and leaving a residue of potassium nitrate, nitrite and oxide. In contact with red hot carbon it deflagrates.

Soluble in water (1 in 4), boiling water (10 in 4); sparingly soluble in alcohol (90 per cent.).

Standard, B.P.—Potassium nitrate contains not less than 99 per cent. of KNO_3. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for ammonium compounds, copper, zinc, chloride and sulphate.

Action and Uses.—Potassium nitrate, given internally, has a marked salt action, causing an increased flow of urine and, in large doses, irritation of the kidneys and gastro-intestinal tract. It is employed as a diuretic, but is better avoided when there is inflammation of the stomach, kidneys or bladder. Potassium nitrate should be **administered** in dilute solution. It is occasionally used in gargles with potassium chlorate for inflamed throats, and nitre or saltpetre

balls (sal prunella) are sucked for a similar purpose. Blotting-paper saturated with a strong solution of potassium nitrate and dried is burned and the fumes inhaled for asthma. Asthma powders and papers are impregnated with potassium nitrate to assist combustion.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

AMMONII NITRAS.—Ammonium nitrate, NH_4NO_3, occurs in colourless, odourless crystals. On heating, it melts at 165° and is decomposed at higher temperatures, chiefly into nitrous oxide and water. Ammonium nitrate has a typical salt action and may be used as an ingredient of diuretic mixtures. Like the nitrates of sodium and potassium, it is more irritant than such salts as sodium and potassium chlorides, and it is rarely employed in medicine. It should be administered with care when there is irritation of the stomach or kidneys. Ammonium nitrate in doses of 7½ grains in keratin-coated tablets is given in conjunction with a ketogenic diet with the object of rendering the urine acid in the treatment of chronic coli bacilluria. It is also used for the manufacture of nitrous oxide gas and as a chemical reagent. Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

SODII NITRAS.—Sodium nitrate, $NaNO_3$, is mined in Chili and Peru. After purification, it occurs as colourless, odourless, transparent, rhombohedral crystals, having a cooling, saline, slightly bitter taste. It is soluble in water (1 in 1·1), boiling water (1 in 0·6) and boiling alcohol (1 in 40). Sodium nitrate resembles potassium nitrate in its action. It is rarely used in medicine, but in the crude state it is known as Chili saltpetre and is used as an artificial manure. Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparation

Charta Nitrata, B.P.C.—(Charta Nit.)—Nitrated Paper. *Syn.*—Saltpetre Paper; Nitre Paper. Blotting paper impregnated with potassium nitrate.

POTASSII PERMANGANAS

(Pot. Permang.)

Potassium Permanganate

$KMnO_4 = 158·0$

Potassium permanganate may be obtained by passing carbon dioxide into an aqueous solution of potassium manganate, which is prepared by fusing manganese dioxide with potassium hydroxide. It occurs in dark purple, slender, prismatic, odourless crystals, with a greenish lustre, having a taste at first sweet, but afterwards disagreeable and astringent. When heated, the salt decrepitates at a temperature of about 240° and decomposes, giving off oxygen and leaving a residue from which water extracts potassium hydroxide. The deep purple colour of the aqueous solution is discharged by easily oxidisable substances such as ferrous sulphate, oxalic acid and organic matter, particularly in the presence of sulphuric acid.

Soluble in water (1 in 20) and boiling water (1 in 3).

Standard, B.P.—Potassium permanganate contains not less than 99 per cent. of $KMnO_4$. It complies with limit tests for chloride and sulphate.

Action and Uses.—Potassium permanganate possesses disinfectant, deodorant and germicidal properties, owing to its oxidising action in acid, neutral, or alkaline solution. It is occasionally administered as an intestinal antiseptic, but is of doubtful value. Good results are said to have been obtained in acute pneumonia by the rectal administration of 4 fluid ounces of a solution of 2 grains of potassium permanganate in 1½ pints of warm water every three hours. Neurasthenia associated with low blood pressure has been treated by the oral administration of potassium permanganate and thyroid, in cachets or capsules. As a cleansing application to foul ulcers or abscesses, a 1 in 1000 solution is suitable; as a gargle, mouth-wash, or vaginal injection, solutions of 1 in 4000 may be used, and for urethral irrigation in the treatment of gonorrhœa a 1 in 800 solution is used. When applied to the nose and throat, potassium permanganate is particularly useful as a prophylactic of infections due to filterable viruses. A 5 per cent. solution of potassium permanganate has a powerful styptic action. Potassium permanganate is a useful antidote to snake poisoning and also to morphine and opium poisoning. In both cases immediate application is necessary, since its action as an antidote is due to direct oxidation of the poison. In cases of snake poisoning, solid potassium permanganate should be applied freely to the wound before absorption of the toxin has taken place.

Potassium permanganate is usually **administered** in pill form, some inert material such as kaolin and soft paraffin being used to form the mass, without the addition of any oxidisable substance. It may also be administered as Liquor Potassii Permanganatis, suitably diluted, although it may cause irritation to the stomach. Solutions of potassium permanganate rapidly stain the skin brown; the stain can be removed from the skin by means of oxalic or sulphurous acids. It is **incompatible** with iodides, reducing agents and most organic substances.

Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

Preparation

Liquor Potassii Permanganatis, B.P.C.—(Liq. Pot. Permang.)—Solution of Potassium Permanganate. 1 per cent. w/v. Dose.– 8 to 15 millilitres (2 to 4 fluid drachms).

This solution was included in the British Pharmacopœia, 1914.

POTASSII PERSULPHAS

(Pot. Persulph.)

Potassium Persulphate

$K_2S_2O_8 = 270{\cdot}3$

Potassium persulphate may be prepared by the electrolysis of a

solution of potassium bisulphate under conditions similar to those described under Ammonii Persulphas. It occurs as colourless crystals or as a white, crystalline powder and has properties similar to those of ammonium persulphate.

Soluble in water (1 in 3); insoluble in dehydrated alcohol.

Standard.—Potassium persulphate, determined by the method for Ammonii Persulphas, contains not less than 98 per cent. of $K_2S_2O_8$; each millilitre of N/10 potassium permanganate is equivalent to 0·01352 gramme of $K_2S_2O_8$.

Action and Uses.—Potassium persulphate has strong oxidising and bleaching properties. It is used as a disinfectant for the hands, to sterilise and bleach sponges, and in photography to reduce dense negatives. Potassium persulphate has been added to flour as an "improver." Bakers using such flour are liable to suffer from a form of dermatitis, commonly known as "baker's eczema" or "baker's itch."

POTASSII PHOSPHAS

(Pot. Phosph.)

Potassium Phosphate

$K_2HPO_4 = 174·2$

Synonym—Di-potassium Hydrogen Phosphate.

Potassium phosphate may be prepared by mixing phosphoric acid with a sufficient quantity of potassium hydroxide or carbonate to produce a slightly alkaline reaction, filtering and evaporating. It occurs in irregular masses, or as a granular, deliquescent powder. At a red heat it is converted into pyrophosphate.

Very **soluble** in water; insoluble in alcohol.

Standard.—Potassium phosphate, determined by the method of the British Pharmacopœia for Sodii Phosphas, contains not less than 98 per cent. of K_2HPO_4, calculated on the salt dried at 100°; each millilitre of N/2 sulphuric acid is equivalent to 0·08711 gramme of K_2HPO_4. Loss on drying at 100°, not more than 5 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. It complies with the limit tests for chlorides, sulphates and calcium and magnesium in Sodii Phosphas.

Action and Uses.—Potassium phosphate is a saline purgative resembling sodium phosphate in its action.

Dose.—0·6 to 2 grammes (10 to 30 grains).

POTASSII PHOSPHAS ACIDUS

(Pot. Phosph. Acid.)

Potassium Acid Phosphate

$KH_2PO_4 = 136{\cdot}1$

Synonyms—Potassium Di-hydrogen Phosphate; Potassium Biphosphate.

Potassium acid phosphate, KH_2PO_4, may be prepared by treating 100 parts of phosphoric acid (25 per cent.) with 35 parts of dried potassium carbonate, adding to the solution a further 100 parts of the acid and evaporating. It occurs in the form of large, colourless, quadratic crystals. It is not decomposed at a temperature of 200°, but at a red heat it loses one molecule of water and yields potassium metaphosphate, KPO_3.

Very **soluble** in water, the solution having an acid reaction.

Standard.—Potassium acid phosphate, determined by the method of the British Pharmacopœia for Sodii Phosphas Acidus, contains not less than 97 per cent. of KH_2PO_4; each millilitre of N/2 sodium hydroxide is equivalent to 0·06807 gramme of KH_2PO_4. Arsenic limit, 5 parts per million. Lead limit, 5 parts per million. 1 gramme dissolved in 50 millilitres of water requires for neutralisation to the green colour of bromocresol green, indicative of *p*H 4·5, not more than 1·0 millilitre of N/10 sulphuric acid (limit of dipotassium phosphate). It complies with the limit tests for chlorides and sulphates in Sodii Phosphas Acidus.

Action and Uses.—Potassium acid phosphate has properties resembling those of sodium acid phosphate and is used to render the urine acid. It is a somewhat more active diuretic than the sodium salt, and is best **administered** in dilute aqueous solution, in small doses frequently repeated.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

POTASSII QUADROXALAS

(Pot. Quadroxal.)

Potassium Quadroxalate

$C_4H_3O_8K,2H_2O = 254{\cdot}1$

Synonyms—Sal Acetosella; Potassium Tetroxalate; Salt of Sorrel; Sal Limonis; Salts of Lemon.

Potassium quadroxalate, $KHC_2O_4,H_2C_2O_4,2H_2O$, may be prepared by mixing hot, concentrated, aqueous solutions of potassium oxalate and oxalic acid in the required proportions. It occurs in colourless, transparent crystals and has an acid taste.

Soluble in water (1 in about 30), boiling water (1 in about 2).

Action and Uses.—Potassium quadroxalate is not used medicinally, but is solely employed for removing ink stains and iron mould from clothing and table-linen, and for cleaning white straw hats. It is sometimes used mixed with cream of tartar. In cases of **poisoning** by potassium oxalates, the procedure adopted under Acidum Oxalicum should be followed.

POTASSII BINOXALAS.—Potassium binoxalate is potassium acid oxalate, $KHC_2O_4,2H_2O$, and is found in various species of *Oxalis* and *Rumex*. It may be prepared by partly neutralising a solution of oxalic acid with the required quantity of potassium carbonate. It occurs in colourless crystals and has an acid taste. The anhydrous salt and a tetrahydrate are also known. This salt was sold as salts of lemon but is now replaced for this purpose by potassium quadroxalate. Its aqueous solution is unstable below 50° and decomposes with the formation of the less soluble potassium quadroxalate. It is soluble in water (1 in 5 at 60°).

POTASSII OXALAS.—Potassium oxalate, $K_2C_2O_4$, is the neutral salt and occurs in colourless crystals soluble in water. This neutral oxalate is added to blood to precipitate calcium and prevent coagulation.

POTASSII SALICYLAS

(Pot. Salicyl.)

Potassium Salicylate

$C_7H_5O_3K = 176{\cdot}1$

Potassium salicylate, $C_6H_4(OH)\cdot COOK$, may be obtained by treating a hot solution of salicylic acid with potassium bicarbonate or potassium carbonate until only very faintly acid, filtering, and evaporating to dryness. It occurs as brilliant, colourless, silky needles, or as a white powder. When heated at 210° to 220°, it decomposes quantitatively into dipotassium *p*-hydroxybenzoate, phenol and carbon dioxide, but in the presence of excess of potassium hydroxide this change does not take place. When treated with bromine and an excess of potassium hydroxide, it yields a red substance, insoluble in alcohol and ammonia.

Soluble in water and alcohol.

Standard.—Potassium salicylate, determined by the method of the British Pharmacopœia for Sodii Salicylas, contains not less than 98 per cent. of $C_7H_5O_3K$, calculated on the substance dried at 110°; each millilitre of N/2 sulphuric acid is equivalent to 0·08807 gramme of $C_7H_5O_3K$. Loss on drying at 110°, not more than 1 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies with the limit tests for chlorides and sulphates in Sodii Salicylas.

Action and Uses.—Potassium salicylate closely resembles sodium salicylate in its action, and is employed similarly for oral administration.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

POTASSII SULPHAS
(Pot. Sulph.)
Potassium Sulphate
$K_2SO_4 = 174{\cdot}3$

Synonym—Sal Polychrestum.

Potassium sulphate may be obtained by the interaction of sulphuric acid and potassium carbonate. It occurs in colourless, transparent, hard, rhombic prisms, terminated by six-sided pyramids, or as a white powder, having a somewhat bitter, saline taste. When heated it decrepitates. At a bright red heat it fuses, and at a white heat it is partially decomposed.

Soluble in water (1 in 10), boiling water (1 in 4); insoluble in alcohol.

Standard.—Potassium sulphate, determined by the method of the British Pharmacopœia for Sodii Sulphas, contains not less than 99 per cent. of K_2SO_4; 1 gramme of $BaSO_4$ is equivalent to 0·7467 gramme of K_2SO_4. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. 0·3 gramme complies with the limit test for chlorides. 1 gramme dissolved in 50 millilitres of water forms a solution which is not acid to methyl orange (absence of acid sulphate). 1 gramme warmed with 10 millilitres of water does not produce a blue colour on the addition of dilute solution of ammonia (limit of copper), and the solution gives no precipitate on the addition of hydrogen sulphide solution (limit of zinc). 1 gramme dissolved in 20 millilitres of water gives no precipitate when boiled with 1 millilitre of dilute solution of ammonia (limit of aluminium and iron).

Action and Uses.—Potassium sulphate is a saline purgative resembling sodium sulphate in its action. It is said to enhance anæsthesia when added to some local anæsthetics (0·25 to 0·5 per cent.). Potassium sulphate is **administered** in mixture form, freely diluted, since strong solutions are irritating to the stomach and intestines.

Dose.– 1 to 3 grammes (15 to 45 grains).

POTASSII TARTRAS
(Pot. Tart.)
Potassium Tartrate
$C_8H_8O_{12}K_4,H_2O = 470{\cdot}5$

Synonym—Normal Potassium Tartrate.

Potassium tartrate, $(K_2C_4H_4O_6)_2,H_2O$, may be obtained by neutralising potassium acid tartrate with potassium carbonate. It occurs in small, colourless, translucent, four or six-sided prisms, or as a white, crystalline, slightly deliquescent powder, with a saline, cooling taste. When

heated, it chars and gives off inflammable vapours having the odour of burnt sugar. At a higher temperature, the carbon is burned off and a white fused mass of potassium carbonate remains.

Soluble in water (1 in 0·25); insoluble in alcohol.

Standard.—Potassium tartrate, determined by the method of the British Pharmacopœia for Sodii et Potassii Tartras, contains not less than 99 per cent. of $C_8H_8O_{12}K_4,H_2O$; each millilitre of N/2 sulphuric acid is equivalent to 0·05881 gramme of $C_8H_8O_{12}K_4,H_2O$. Arsenic limit, 2 parts per million. Lead limit, 20 parts per million. 0·5 gramme complies with the limit tests for chlorides and sulphates. Dissolve 2 grammes in 40 millilitres of water and 5 millilitres of dilute solution of ammonia; no darkening occurs on the addition of 1 drop of sodium sulphide solution (limit of copper and iron). Dissolve 1 gramme in 10 millilitres of water; the solution is not alkaline to phenolphthalein, and requires not more than 0·1 millilitre of N/10 sodium hydroxide to produce a pink colour (limit of alkali and of free acid).

Action and Uses.—Potassium tartrate is a typical saline purgative. The tartrates of the alkalis are less readily absorbed than the citrates; their purgative action is therefore more marked, whilst their action as diuretics and as antacids in rendering the urine alkaline is less pronounced. Potassium tartrate is **administered** in mixture form, well diluted.

Dose.– 2 to 16 grammes ($\frac{1}{2}$ to 4 drachms).

POTASSII TARTRAS ACIDUS

(Pot. Tart. Acid.)

Potassium Acid Tartrate

$C_4H_5O_6K = 188·1$

Synonyms—Cream of Tartar; Purified Cream of Tartar.

Potassium acid tartrate, $COOH·(CHOH)_2·COOK$, is obtained from crude cream of tartar, or argol, which is deposited from grape juice during fermentation and is found also in the lees of wine; it may also be obtained from tartaric acid by precipitation with potassium carbonate. It occurs as colourless and odourless, slightly opaque crystals, or as a white, gritty, crystalline powder, with a pleasant, acidulous taste. The aqueous solution has an acid reaction.

Soluble in water (1 in 220), boiling water (1 in 16); insoluble in alcohol (90 per cent.).

Standard, B.P.—Potassium acid tartrate contains not less than 99·5 per cent. of $C_4H_5O_6K$, calculated on the substance dried at 100°. Loss on drying at 100°, not more than 1 per cent. Arsenic limit, 2 parts per million. Lead limit, 20 parts per million. It complies also

with limit tests for copper and iron, free tartaric acid, chloride and sulphate.

Action and Uses.—Potassium acid tartrate has an action identical with that of potassium tartrate. It is employed as a laxative in combination with sulphur or jalap as Confectio Sulphuris and Pulvis Jalapæ Compositus. Potus Imperialis is an agreeable cooling and diuretic drink in febrile conditions.

Dose.– 1 to 4 grammes ($\frac{1}{4}$ to 1 drachm).

POTASSII BOROTARTRAS.—Potassium borotartrate occurs usually in colourless scales and is soluble in its own weight of water; it is obtained by dissolving 5 parts of potassium acid tartrate and 2 parts of borax in water with the aid of heat, and evaporating the solution to dryness.

Preparation

Potus Imperialis, B.P.C.—(Potus Imperial.)—Imperial Drink. *Syn.*—Haustus Imperialis. Potassium acid tartrate, 0·45 per cent. w/v, with citric acid, sucrose, oil of lemon and tincture of lemon, in distilled water; each fluid ounce contains 2 grains of potassium acid tartrate.

PROCAINÆ HYDROCHLORIDUM

(Procain. Hydrochlor.)

Procaine Hydrochloride

$C_{13}H_{20}O_2N_2,HCl = 272{\cdot}6$

Synonym—Ethocaine Hydrochloride.

Procaine hydrochloride is the hydrochloride of diethylaminoethyl-*p*-aminobenzoate, $NH_2{\cdot}C_6H_4{\cdot}COO{\cdot}C_2H_4N(C_2H_5)_2$, which may be prepared by the action of diethylaminoethylchloride on sodium *p*-aminobenzoate. It occurs as a stable, white, odourless, crystalline powder, with a faintly bitter taste, followed by a temporary insensibility of the tongue. A 10 per cent. w/v aqueous solution is neutral to litmus, and is not precipitated by the addition of sodium bicarbonate. On the addition of a solution of sodium hydroxide or sodium carbonate, a colourless, oily precipitate of the base is produced which becomes crystalline on standing. The base crystallises from dilute alcohol with two molecules of water, and melts at about 51°; when recrystallised from light petroleum it is anhydrous and has a melting-point of 58° to 60°. When a 1 in 50 aqueous solution, containing a trace of hydrochloric acid and of sodium nitrite, is added to a solution of betanaphthol in dilute sodium hydroxide solution, a scarlet precipitate is produced.

Procaine hydrochloride may be distinguished from cocaine hydrochloride by adding to a 1 in 50 aqueous solution, acidified with two or three drops of dilute sulphuric acid, a few drops of N/10 potassium permanganate solution; the permanganate solution is immediately decolourised. It may be distinguished from orthocaine by the formation

of a precipitate on the addition of solution of iodine, and on the addition of potassio-mercuric iodide solution, the latter reaction also serving to distinguish it from benzocaine. The aqueous solution may be boiled without decomposition in alkali-free glass vessels.

Soluble in water (1 in 1) and alcohol (90 per cent.) (1 in 8); slightly soluble in chloroform; insoluble in ether.

Standard, B.P.—Procaine hydrochloride has a melting-point of 154° to 156°. Ash, not more than 0·1 per cent. It complies also with a limit test for readily carbonisable substances.

Action and Uses.—Procaine hydrochloride is a local anæsthetic resembling cocaine in its action, but is less toxic and less irritating. It is, moreover, the most widely used of the synthetic substitutes for cocaine. Procaine hydrochloride has little power of penetration, and is not satisfactory for surface anæsthesia. When injected, its action is rapid and moderately powerful, but somewhat transitory; to obtain a prolonged and intense anæsthetic effect it is therefore usual to add a small proportion of adrenaline, with the object of delaying dispersion from the site of injection. With this addition, solutions of procaine hydrochloride are regarded as equivalent in activity to cocaine solutions of the same strength.

Solutions containing 5 per cent. w/v are isotonic with blood serum; weaker solutions require the addition of a suitable proportion of sodium chloride. For infiltration and anoci-association anæsthesia, 0·25 to 0·5 per cent. w/v solutions are employed, for nerve trunks, 1 or 2 per cent. w/v solutions, and for intraspinal anæsthesia, a 5 per cent. w/v solution. To increase the specific gravity of procaine hydrochloride solutions for intraspinal injection, 5 per cent. w/v of dextrose may be added. For dental use, a 2 per cent. w/v solution is employed in doses of 1 millilitre (15 minims), with 0·06 millilitre (1 minim) of 1 in 1000 solution of adrenaline hydrochloride. In ophthalmic surgery, 5 and 10 per cent. w/v solutions are used; they exert no mydriatic effect. Solutions with adrenaline frequently darken in colour. Care should be taken to avoid injecting procaine hydrochloride into a vein, since toxic effects have been observed from its inadvertent intravenous injection. The toxic action of procaine hydrochloride may be reduced by a preliminary dose of phenobarbitone or other barbiturate. Constant wetting of the skin with solutions of procaine hydrochloride causes, in some individuals, a dermatitis characterised by dryness and cracking of the skin. Solutions of procaine hydrochloride for **injection** may be sterilised by tyndallisation or by filtration. The containers must comply with the tests for limit of alkalinity of glass, and the solutions should be stored protected from light. In cases of **poisoning** by procaine hydrochloride, hot coffee and stimulants should be administered and the usual methods adopted to prevent collapse.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains); up to 1 gramme (up to 15 grains), by subcutaneous injection; up to 0·15 gramme (up to 2½ grains), by intrathecal injection.

PROFLAVINA
(Proflavin.)

Proflavine

$C_{13}H_{11}N_3,H_2SO_4 = 307{\cdot}2$

Proflavine is 2 : 8-diaminoacridine sulphate, and is obtained as an intermediate product in the preparation of acriflavine. It is an orange-red to brownish-red crystalline powder. An aqueous solution, when freely diluted, has a pronounced greenish fluorescence. An aqueous solution yields a precipitate on the addition of formaldehyde and gives the reactions characteristic of sulphates.

Soluble in water (about 1 in 200).

Standard.—Proflavine, determined by the method for Euflavina, contains not less than 97 per cent. of $C_{13}H_{11}N_3,H_2SO_4$, calculated on the substance dried at 100°; each millilitre of M/10 potassium ferricyanide is equivalent to 0·09216 gramme of $C_{13}H_{11}N_3,H_2SO_4$. Loss on drying at 100°, not more than 10 per cent. Sulphated ash, not more than 1 per cent. 0·5 gramme dissolves completely in 250 millilitres of 0·9 per cent. solution of sodium chloride, and the solution remains bright when kept for twelve hours in the dark.

Action and Uses.—Proflavine is an efficient antiseptic for wounds because it acts in the presence of an excess of serum. It, therefore, possesses advantages over such substances as mercuric chloride, which lose most of their activity in the presence of proteins. Proflavine acts in concentrations much lower than those which inhibit phagocytosis and produce irritation. A solution of proflavine, 1 in 150,000, will kill *Staphylococcus aureus* in serum in forty-eight hours, whereas a solution of mercuric chloride, 1 in 20,000, is necessary for the same purpose. The flavine compounds cannot, however, produce a rapid disinfectant action except in high concentrations. Proflavine may be used in solutions of similar strength to those of acriflavine. It is also used as a urinary antiseptic in the treatment of gonorrhœa, both as a lotion and by oral administration; damage to the kidneys and liver may occur and it should be **administered** internally with great caution. Proflavine stains may be removed by the application of a dilute solution of sulphurous acid. Solutions for **injection** may be prepared by aseptic methods. They should be stored protected from light.

HOMOFLAVINA.—Homoflavine is the hydrochloride of 3:7-dimethyl-2:8-diamino-10-methylacridinium chloride. In its chemical and general properties it is closely related to acriflavine.

PRUNUS
(Prun.)

Prune

Prune is the dried, ripe fruit of *Prunus domestica* Linn. var. *Juliana*

DC. (Fam. Rosaceæ), cultivated in France. The fruit is collected when ripe, and dried partly by artificial heat and partly in the sun.

The fruit is an irregularly flattened, ovoid drupe, about 3 centimetres long, purplish-black in colour, and with a shrivelled surface. The pulp is brownish, and surrounds a hard, flattened, oval stone. The pulp of prune **contains** from 23 to 56 per cent. of invert sugar, together with malic and citric acids, a little fat and pectin.

Action and Uses.—Prune is nutritious and demulcent, and is employed for its laxative action in the preparation of confection of senna and other laxative confections.

CERASUS.—The red cherry is the fruit of *Prunus Cerasus* Linn. var. *caproniana* DC. (Fam. Rosaceæ), a tree bearing sessile umbels each consisting of a few white flowers on long pedicels; it is cultivated in England. The fruit is a red, globose, fleshy drupe, glabrous and destitute of bloom, about 2 centimetres in diameter, and having a firmly attached, slender peduncle. The mesocarp has an acid taste and the seed is enclosed in a smooth, somewhat flattened, stony endocarp. The black cherry, obtained from *Prunus avium* Linn., is slightly larger, dark purple in colour and has a sweet taste. Cherries contain about 6 to 9 per cent. of sugar (invert sugar and sucrose), organic acids (chiefly malic and citric acids), pectin, colouring matter, etc. The juice of the red cherry is employed as a flavouring and colouring agent and in the preparation of syrup of cherry.

Preparation

Syrupus Cerasi, B.P.C.—(Syr. Ceras.)—Syrup of Cherry. A solution of sucrose in the juice expressed from red cherry. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

PRUNUS SEROTINA

(Prun. Serot.)

Wild Cherry Bark

Synonyms—Pruni Virginianæ Cortex; Prunus Virginiana.

Wild cherry bark is the bark of the wild or black cherry, *Prunus serotina* Ehrhardt (Fam. Rosaceæ), a tree widely distributed over North America, particularly in the Northern and Central States. The bark is collected in the autumn, when it is most active, preferably from young stems and branches, and dried.

The bark occurs in irregular fragments, or in curved or channelled pieces up to 12 centimetres in length and 5 centimetres in width and about 2 millimetres in thickness. The young bark is covered externally with a thin, smooth, reddish-brown to brownish-black, papery cork, which is frequently exfoliated, disclosing the smooth, greenish-brown cortex; both the cork and the underlying cortex show numerous, transversely elongated lenticels. Older bark is darker and rougher. The inner surface is cinnamon-brown in colour, and shows fine, wavy, longitudinal striations, which anastomose to form a projecting reticulation. The fracture is short and granular. The smoothed, transversely

cut surface is reddish-grey in colour, and usually shows numerous pale red, medullary rays, alternating with phloem strands containing sclerenchymatous tissue which, on the inner margin, projects beyond the medullary rays. The drug has a slight odour and an astringent, aromatic, bitter taste recalling that of bitter almond.

The diagnostic **microscopical** characters are the numerous sclerenchymatous cells, usually in groups, and often branched; the absence of typical phloem fibres; the minute starch grains in the parenchyma; near the sclerenchyma, the prismatic crystals and occasional cluster-crystals of calcium oxalate.

Wild cherry bark **contains** *d*-mandelonitrile glycoside (prunasin) and an enzyme, which interact in the presence of water and yield benzaldehyde, hydrocyanic acid and dextrose. Benzoic, trimethylgallic and *p*-coumaric acids and a small amount of essential oil are present. Other constituents are tannin, a phytosterol, fatty acids, and resinous substances which yield β-methylæsculetin on hydrolysis with acid. Good specimens of drug yield from 0·075 to 0·16 per cent. of hydrocyanic acid. It yields to alcohol (60 per cent.) from 17 to 23 per cent. of extractive. The ash is about 3 to 4 per cent., and the acid-insoluble ash from 0·2 to 0·6 per cent. Young bark is more active than the thick bark from old stems.

Substitutes.—A form of the bark, known as "rossed" bark, sometimes occurs in commerce; this consists of bark from which the cortex, in addition to the cork, has been removed; its uniformly dark cinnamon-brown outer surface has a rough or rasped appearance, and exhibits under a lens pale, longitudinal strands of sclerenchymatous cells alternating with darker medullary rays. Barks from other species of *Prunus* are occasionally substituted for the official drug and may be recognised by the presence of fibres or by their astringent taste, which is deficient in the flavour of bitter almond. Old bark shows numerous depressions on the outer surface, and no lenticels.

Standard, B.P.—Wild cherry bark contains not more than 2 per cent. of other organic matter. The thickness of the bark does not exceed 3 millimetres.

Wild cherry bark, in powder (Pulvis Pruni Serotinæ; Pulv. Prun. Serot.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Preparations of wild cherry bark are used to relieve the cough in phthisis, bronchitis, etc. The mildly sedative property is generally credited to the small quantity of hydrocyanic acid present. It is **administered** as Syrupus Pruni Serotinæ or as Tinctura Pruni Serotinæ.

Dose.– 1 to 2 grammes (¼ to ½ drachm).

Preparations

Syrupus Pruni Serotinæ, B.P.—(Syr. Prun. Serot.)—Syrup of Wild Cherry. *Syn.*—Syrupus Pruni Virginianæ; Syrup of Virginian Prune. A solution of sucrose in the liquid obtained by percolating wild cherry bark with glycerin and water; it contains active constituents equivalent to 15 per cent. w/v of the bark. It should be stored in well-closed containers in a cool place. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms)

Tinctura Pruni Serotinæ, B.P.C.—(Tinct. Prun. Serot.) Tincture of Wild Cherry. *Syn.*—Tinctura Pruni Virginianæ; Tincture of Virginian Prune. 1 in 5. Dose.—2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914, under the name of Tinctura Pruni Virginianæ.

PSYLLIUM
(Psyll.)

Psyllium

Synonym—Flea Seed.

Psyllium consists of the dried, ripe seeds of *Plantago Psyllium* Linn. and of *P. arenaria* Waldst. and Kit. (Fam. Plantaginaceæ), annual herbs which are natives of Barbary and Southern Europe.

The seeds of *P. Psyllium* are about 2 to 3 millimetres long and 0·8 to 1·2 millimetres wide, rounded-oblong in outline, dark reddish brown, and with a shining, glossy surface. They are very transparent and show the embryo as a paler, longitudinal patch, about one-third the width of the seed as seen through the outer layers. In the centre of the concave surface is the pale-coloured hilum; across the centre of the convex surface is a slight transverse constriction. The embryo and endosperm are similar to those of the seeds of ispaghula. When soaked in water, the seeds become surrounded by a layer of colourless, transparent mucilage. The seeds of *P. arenaria* closely resemble those of *P. Psyllium*, but are more elliptical in outline; they are blackish-brown in colour and not very transparent; the surface is rather dull. They are from 2 to 2·5 millimetres long and 1 to 1·5 millimetres wide at the centre; the furrow of the concave surface frequently extends to the extreme end of the seed.

The diagnostic **microscopical** characters of psyllium are similar to those of ispaghula, but the epidermis does not split away from the remainder of the seed as it does in ispaghula.

Psyllium **contains** mucilage as its principal constituent, and also fixed oil and proteins. It yields about 2·5 to 4 per cent. of ash.

Substitute.—The seeds of *Plantago lanceolata* Linn. are distinguished by their yellowish-brown colour, the dark furrow with a black, central hilum and the failure to produce any appreciable layer of mucilage when soaked in water. One hundred seeds weigh about 0·16 gramme.

Standard.—Psyllium contains not more than 3 per cent. of foreign organic matter. One hundred seeds weigh not less than 0·09 gramme and not more than 0·13 gramme. 1 gramme, agitated gently and occasionally during twenty-four hours in a 25 millilitre stoppered cylinder filled to the 20 millilitre mark with water, and allowed to stand for one hour, occupies a volume of not less than 12 millilitres.

Psyllium, in powder (Pulvis Psyllii : Pulv. Psyll.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Psyllium, on account of its content of mucilage, is used as a demulcent. It has the property of absorbing and retaining water and is therefore used as a bulk-providing medium in the treatment of chronic constipation. For this reason, psyllium is administered as an alternative to agar or linseed. The average dose is from two to four tablespoonfuls taken with a draught of water. The correct amount for the individual case can only be ascertained by experience. It has also been used in industry as a dressing for linen.

PTEROCARPUS
(Pterocarp.)
Red Sanders Wood

Synonyms—Pterocarpi Lignum; Red Sandal Wood; Ruby Wood.

Red sanders wood is the heartwood of *Pterocarpus santalinus* Linn. (Fam. Leguminosæ), a small tree indigenous to Southern India and the Philippine Islands. The wood is imported in irregular logs or billets, 7 to 15 centimetres thick and about 1 metre long, which have been deprived of their bark and pale sapwood.

The heartwood is of a deep purplish-red colour and very hard, heavy and fibrous, but easily splits longitudinally. The smoothed, transversely cut surface shows an absence of annual rings, but exhibits darker tangential bands of dense wood fibres alternating with narrow, paler, interrupted bands of wood parenchyma, on the inner borders of which are found the diffusely arranged vessels; very fine, pale medullary rays cross these bands at right angles and are only just visible at a magnification of about 10 diameters. For pharmaceutical use the wood is generally obtained as a coarse powder or in small, hard, splintery raspings. The wood imparts a blood-red colour to alcohol, but yields hardly anything to water. It is almost odourless, and has a somewhat astringent taste.

The diagnostic **microscopical** characters are the thick-walled, strongly lignified fibres, more or less cylindrical in the middle part but with thin tapering ends; the medullary rays, which are about 7 to 9 cells high and usually uniseriate, a few being biseriate in the middle part; the large vessels with closely approximated, slit-like bordered pits; the prismatic crystals of calcium oxalate in the parenchyma bordering upon the fibres. All the cell walls are brownish-red, and the cells are filled with masses of reddish-brown resin; the red colour is removed by warming with solution of chloral hydrate.

Red sanders wood **contains** the red colouring matters, santalin (santalic acid) and deoxysantalin. Santalin is insoluble in water, but yields a blood-red solution with alcohol, yellow with ether, and violet with ammonia and caustic alkalis. The wood also contains santal, pterocarpin and homopterocarpin, three colourless, crystalline substances. It yields from 1 to 2 per cent. of ash.

Standard.—Red sanders wood yields to alcohol (95 per cent.) not less than 20 per cent. of extractive.

Uses.—Red sanders wood is employed solely for its colouring matter, which is precipitated by mineral acids.

PULSATILLA
(Pulsat.)

Pulsatilla

Synonym—Pasque Flower.

Pulsatilla consists of the dried herb, *Anemone Pulsatilla* Linn. (Fam. Ranunculaceæ), a plant indigenous to Great Britain, Europe and Siberia.

The herb possesses a stout, somewhat woody rhizome producing a rosette of stalked leaves and an erect scape, about 12 to 20 centimetres long, bearing a whorl of three bracteoles which form an involucre about 2 to 3 centimetres below the large, solitary, terminal flower. The leaves are tripinnate, the ultimate lobes being linear with acute points, and the petioles often purplish. The sessile bracteoles are divided to the base into linear segments, and the flower possesses six light purple sepals, silky on the outside. The fruits are small, brown, hairy achenes with feathery styles about 3·5 centimetres long. The whole plant, especially the bases of the petioles, is covered with silky hairs. The taste of the fresh herb is acrid and burning, but is less conspicuous in the dried herb and gradually diminishes on keeping; the drug is odourless.

The herb **contains** a crystalline, vesicant substance (anemone camphor) which is soluble in ether and chloroform and gives off an intensely irritating vapour. It slowly decomposes into anemonin and *iso*anemonic acid, the change taking place more rapidly in the presence of water. Anemonin is crystalline, tasteless and odourless when pure, and melts at about 152°; it is volatile in steam. *iso*Anemonic acid is crystalline and tasteless.

Substitute.—*Anemone pratensis* Linn. possesses smaller, blackish-purple flowers with the tips of the segments bent backwards. This species is used in homœopathic practice.

Standard.—Pulsatilla contains not more than 3 per cent. of foreign organic matter.

Action and Uses.—Pulsatilla has been employed for use in dysmenorrhœa and amenorrhœa, and for the relief of headache and neuralgia, but there is no reliable evidence of its value. It is **administered** as Extractum Pulsatillæ Liquidum or Tinctura Pulsatillæ, and as Liquor Caulophylli et Pulsatillæ or Liquor Caulophylli et Pulsatillæ Compositus.

Preparations

Elixir Euonymi et Pulsatillæ, B.P.C.—(Elix. Euonym. et Pulsat.)—Elixir of Euonymus and Pulsatilla. Tincture of euonymus and tincture of pulsatilla, of each 1 in 8, in simple elixir. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Extractum Pulsatillæ Liquidum, B.P.C.—(Ext. Pulsat. Liq.)—Liquid Extract of Pulsatilla. 1 in 1. Dose.– 0·12 to 0·3 millilitre (2 to 5 minims).

Liquor Caulophylli et Pulsatillæ, B.P.C.—(Liq. Cauloph. et Pulsat.)—Solution of Caulophyllum and Pulsatilla. Liquid extract of caulophyllum, 1 in 4, and liquid extract of pulsatilla, 1 in 20, with glycerin and alcohol (60 per cent.). Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Liquor Caulophylli et Pulsatillæ Compositus, B.P.C.—(Liq. Cauloph. et Pulsat. Co.)—Compound Solution of Caulophyllum and Pulsatilla. Liquid extracts of caulophyllum, about 1 in 6, pulsatilla, 1 in 20, aletris, 1 in 10, and black haw, 1 in 5, with glycerin and alcohol (60 per cent.). Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Tinctura Pulsatillæ, B.P.C.—(Tinct. Pulsat.)—Tincture of Pulsatilla. Liquid extract of pulsatilla, 1 in 10. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

PYRETHRI FLOS

(Pyreth. Flos)

Pyrethrum Flower

Synonyms—Insect Flowers; Dalmatian Insect Flowers.

Pyrethrum flower consists of the dried flowerheads of *Chrysanthemum cinerariæfolium* Vis. (Fam. Compositæ), a herbaceous perennial indigenous to Montenegro, Dalmatia and the adjacent coastal islands, and cultivated in those countries and also in Japan, Germany, Great Britain and elsewhere. Pyrethrum flower should be **stored** in closed, well-filled containers, and should not be kept for more than two years.

The capitula occur loose or compressed into masses, the individual capitula being more or less flattened, about 6 to 12 millimetres in diameter, and commonly having a short piece of stalk attached. The receptacle is usually about 5 to 10 millimetres in diameter; it is destitute of paleæ and almost flat, and is surrounded by an involucre of 2 or 3 rows of brownish-yellow, lanceolate bracts. The ray florets number about 15 to 23, and the disc florets about 200 to 300. The ligulate corollas are pale brownish and shrivelled, each being oblong in shape, about 16 millimetres long, and showing three rounded, apical teeth, the central one frequently being smaller in size than the lateral ones; there are about 17 veins in the middle region of the corolla. Each disc floret has a yellow, tubular corolla with 5 short lobes at the summit. All the florets have an inferior, 5-ribbed, oblong cypsela, about 5 millimetres long and surmounted by a membranous, tubular calyx about 1 millimetre in length. The ovaries and lower part of the corollas are covered with numerous, scattered, shining oil glands. The drug possesses a faint but characteristic odour and a slightly bitter taste.

The diagnostic **microscopical** characters are the loose, large-celled,

lignified, moderately thick-walled and pitted parenchyma of the receptacle; the numerous spiny pollen grains, each with 3 pores and measuring about 25 to 28 microns in diameter; the frequent, ovoid-spherical, glandular trichomes, each consisting of 3 or 4 tiers of 2 cells each; the twisted, T-shaped balance-hairs and lignified tissue from the involucral bracts; the fragments of the ray florets, showing cells of the lower epidermis with wavy walls, and of the upper epidermis with puckered papillæ; fragments of the lobes of disc florets; portions of stigmas with papillose tips, and, from the cypselæ, portions of brown resin canals and sclerenchyma, the cells of which contain diamond-shaped crystals as also do the cells of the epidermis.

Pyrethrum flower **contains** pyrethrin I and pyrethrin II, to which it owes its insecticidal properties. These pyrethrins are esters of a keto-alcohol, pyrethrolone, and chrysanthemum monocarboxylic acid and chrysanthemum dicarboxylic acid respectively; they are both soluble in alcohol, benzene, chloroform and light mineral oils, easily hydrolysed by weak alkalis, and decomposed by heat and light. The combined content of the pyrethrins varies from about 0·4 to 2·0 per cent., of which over 90 per cent. is contained in the cypselæ, a little in the involucre and stem, and only traces in the corollas. They are generally present in approximately equal amounts, larger proportions of pyrethrin II being occasionally found. A small amount of volatile oil is also present.

Varieties.—Dalmatian insect flowers are classed as "closed," "half-closed," and "open," and are loosely packed. Those imported from Japan are firmly compressed and include flowers in all stages of development. The "closed" variety of the flowers was formerly considered superior, but it has been shown that fully open flowers, not over-blown and from which the cypselæ have not been lost, contain a larger percentage of the pyrethrins.

Substitutes.—The dried flowerheads of *Ch. roseum* Adam, from the Caucasus, and of *Ch. Marschallii* Aschers, from Persia, having red flowers, are occasionally met with in commerce. They have more than 20, generally nearly 30, ray florets. The flowerheads of *Ch. Leucanthemum* Linn. are sometimes substituted for pyrethrum flower; they are distinguished by the entire absence of calyx or pappus, by the three teeth terminating the strap of the somewhat lanceolate, ligulate corolla, the central teeth being usually the largest, and by the presence of only 7 veins in the strap.

Standard.—Pyrethrum flower contains not less than 0·4 per cent. of pyrethrin I. Ash, not more than 8 per cent. Acid-insoluble ash, not more than 1 per cent.

Pyrethrum flower, in powder (Pulvis Pyrethri Floris : Pulv. Pyreth. Flor.), contains the constituents and possesses the diagnostic microscopical characters of Pyrethri Flos, and complies with the standard for the unground drug.

Assay.—Extract 10 grammes, in No. 85 powder, in a continuous extractor with light petroleum (boiling-range, 40° to 50°). Pour the light petroleum solution, which should be adjusted to approximately 50 millilitres, into the long-necked flask of a micro-Kjeldahl apparatus and rinse the extraction flask with a little light petroleum. Add 5 millilitres of N/1 sodium hydroxide in methyl alcohol, and reflux the

mixture vigorously on a water-bath for two hours. Cool, acidify with N/1 sulphuric acid, and distil in a current of steam until 150 millilitres of aqueous distillate is collected below the light petroleum in the receiver. Transfer the whole to a separator, washing the flask with 20 millilitres of water and then with 10 millilitres of light petroleum. Add 10 grammes of sodium chloride and shake vigorously. After separation, run off the aqueous layer into a second separator and shake with a further 20 millilitres of light petroleum. Repeat the shaking with 20 millilitres of light petroleum, mix the three light petroleum layers, and wash the mixture with three successive portions of water. Transfer the light petroleum to a stoppered bottle, rinse the separator with 10 millilitres of neutral alcohol, adding the rinsings to the contents of the bottle, and rinse the separator with 20 millilitres of water. Add 2 or 3 drops of phenolphthalein solution and titrate with N/50 sodium hydroxide until the aqueous layer shows a distinct pink colouration after vigorous shaking in the stoppered bottle for at least one minute. Deduct the volume of N/50 sodium hydroxide required in a blank experiment on the light petroleum (usually about 0·2 millilitre), and calculate the percentage of pyrethrin I; each millilitre of N/50 sodium hydroxide is equivalent to 0·0066 gramme of pyrethrin I.

Action and Uses.—Pyrethrum flower in powder is used to stupefy and keep away insects. For this purpose it is often mixed with borax or boric acid. It is also employed as an insecticide and insect repellant in the form of an extract diluted with kerosene and used as a spray. Tinctura Pyrethri Floris is used, diluted with 10 parts of water, as an application to the skin to prevent insect bites.

Preparation

Tinctura Pyrethri Floris, B.P.C.—(Tinct. Pyreth. Flor.)—Tincture of Pyrethrum Flower. 1 in 4.

PYRETHRI RADIX
(Pyreth. Rad.)

Pyrethrum Root

Synonyms—Pellitory Root; Spanish Pellitory.

Pyrethrum root is the root obtained from *Anacyclus Pyrethrum* DC. (Fam. Compositæ), a small plant indigenous to Algeria. It is collected in the autumn and dried.

The root is brown, deeply wrinkled longitudinally, cylindrical or somewhat fusiform; it varies from 7 to 15 centimetres in length, is usually unbranched, and frequently shows remains of leaves or a tuft of greyish hairs at the crown which is 10 to 20 millimetres thick. The fracture is short, the smoothed, transverse surface being radiate and showing narrow, yellowish wedges of xylem alternating with wide, whitish medullary rays. Numerous yellow or brown resin glands are

visible in the bark and medullary rays. It has a slight aromatic odour; the taste is characteristically astringent, and the root, when chewed, excites a flow of saliva.

The diagnostic **microscopical** characters are the tabular cork cells, many of which are developed as sclerenchyma; the pitted vessels of the xylem, measuring up to 40 or 50 microns in cross section; the schizogenous oleo-resin glands of the phloem and medullary rays; the presence of inulin and the absence of starch and of calcium oxalate.

Pyrethrum root **contains** a colourless, crystalline acid amide, pellitorine (pyrethrine), $C_{14}H_{25}ON$, which possesses an intensely pungent taste and produces the sialagogue effect; it also contains about 50 per cent. of inulin, hydrocarotin and traces of volatile oil. It yields to alcohol (70 per cent.) about 14 per cent. of extractive.

Substitute.—Sarghine, the root of *Corrigiola littoralis* Linn. (Fam. Illecebraceæ), is sometimes substituted for pyrethrum root. It may be distinguished by the small warty protuberances with which it is crowned, and by the section, which exhibits three or four concentric circles. It is devoid of pungency, but one variety has a phenolic odour resembling that of iodoform.

Standard.—Pyrethrum root yields not more than 7 per cent. of ash.

Pyrethrum root, in powder (Pulvis Pyrethri Radicis : Pulv. Pyreth. Rad.), contains the constituents and possesses the diagnostic microscopical characters of Pyrethrum Radix, and complies with the standard for the unground drug.

Action and Uses.—Pyrethrum root has sialagogue properties and is used to promote salivary effusion in dryness of the mouth and throat. The tincture is applied on cotton wool or rubbed along the gums in toothache, and for this purpose may with advantage be mixed with camphorated chloroform. Pyrethrum root is **administered** in the form of lozenge, pastille (containing 1 grain in each), or tincture.

Preparation

Tinctura Pyrethri, B.P.C.—(Tinct. Pyreth.)—Tincture of Pyrethrum. 1 in 5.
This tincture was included in the British Pharmacopœia, 1914.

PYRIDINA
(Pyrid.)

Pyridine

$C_5H_5N = 79{\cdot}05$

Pyridine is a heterocyclic compound which occurs, together with certain homologues, in the products of the destructive distillation of nitrogenous organic matter. It may be separated from bone oil (Dippel's Oil) or from coal tar by extraction with dilute mineral acids. Pyridine occurs as a colourless, volatile liquid, having a peculiar, unpleasant odour and a bitter taste. Specific gravity, about 0·98; boiling-point,

about 115°. It is a weak tertiary base; its aqueous solution is alkaline to litmus, but does not affect phenolphthalein. It combines with acids to form crystalline salts such as the hydrochloride, C_5H_5N,HCl, and with methyl iodide to form the quaternary ammonium derivative. It has the property of forming double salts with certain metals, especially the chlorides of copper, mercury, zinc and cadmium. With picric acid solution it forms a yellow, crystallisable picrate. In chemical behaviour it resembles benzene, but is more resistant to substitution. Three isomeric mono-substitution products are obtainable (α, β and γ), and by reduction with nascent hydrogen it is converted into piperidine.

Crude pyridine for use in denaturing alcohol requires for neutralisation not less than 9·5 times its volume of N/1 sulphuric acid, using congo-red paper as indicator. When distilled under the conditions laid down for motor fuel, it should give a distillate of at least 50 per cent. v/v at 140°, and of 90 per cent. v/v at 160°; it must comply also with certain limit tests for colour and solubility, and respond to prescribed identity tests.

Miscible with water, alcohol, ether, chloroform, benzene and fixed oils.

Action and Uses.—Pyridine and similar compounds are amongst the products of the dry distillation or slow combustion of most leaves, and to pyridine has been ascribed in part the beneficial action of the various burning-powders and cigarettes used in asthma. It apparently acts as a depressant to the nerve endings in the bronchioles. It is much less toxic than either collidine or nicotine, which are given off with pyridine from burning tobacco. Crude pyridine is used as a denaturant in the manufacture of methylated spirits.

PIPERIDINA.—Piperidine, or hexahydropyridine, $C_5H_{11}N$, is prepared by the dry distillation of piperine, or by the reduction of pyridine. It occurs as a colourless, limpid liquid, having an ammoniacal and peppery odour and a burning, caustic taste. Specific gravity, about 0·881; boiling-point, about 106°. It is a strongly basic secondary amine and yields crystalline salts with acids. It is miscible with water, alcohol and ether. Piperidine has a weak, coniine-like action, but is rarely used in medicine.

PIPERIDINÆ TARTRAS.—Piperidine tartrate, $C_5H_{11}N,C_4H_6O_6$, occurs in the form of a colourless, crystalline powder, having a faint odour and a pleasant taste. It is readily soluble in water. Piperidine tartrate has been employed as a uric acid solvent in gout and rheumatism, but its value for this purpose is doubtful. It may be administered in cachets or mixtures. Dose.– 0·6 to 1 gramme (10 to 15 grains).

PYROGALLOL

(Pyrogall.)

Pyrogallol

$C_6H_6O_3 = 126·0$

Synonym—Pyrogallic Acid.

Pyrogallol is 1:2:3-trihydroxybenzene, $C_6H_3(OH)_3$, and may be

obtained by the action of heat on gallic acid. It occurs in light, white and feathery, or dense, hard crystals, which sublime on heating and become discoloured on exposure to light and air. A solution of pyrogallol gives a blue colour with solution of ferrous tartrate, and a red colour with solution of ferric chloride. Alkaline solutions of pyrogallol rapidly turn black in contact with air owing to the absorption of oxygen. The alkaline solution absorbs oxygen quantitatively. It should be **stored** in well-closed, amber-coloured bottles, and not exposed to light.

Soluble in water (1 in 2), freely soluble in alcohol and ether.

Standard.—Pyrogallol melts between 129° and 135°. Ash, not more than 0·1 per cent. The solution in water is clear, colourless or slightly yellow, and neutral to methyl orange.

Action and Uses.—Pyrogallol, when taken internally, exerts a toxic action on the blood; methæmoglobin is formed, passes into the plasma, and leaves the red corpuscles as granular debris; jaundice and acute nephritis may follow, hence it is now very rarely given internally. It is employed topically as a parasiticide and mildly irritant ointment in chronic skin diseases such as psoriasis, lupus vulgaris and ringworm, but it is not suitable for continuous application over large areas or denuded surfaces, since absorption and consequent poisoning may result. In psoriasis, Unguentum Pyrogallolis, often diluted with 1 to 5 parts of soft paraffin, is used, and Unguentum Pyrogallolis Compositum is employed in psoriasis and chronic eczema. Jarisch's ointment is composed of 60 grains of pyrogallol in 1 ounce of lard. A powder composed of pyrogallol, 1 part, and starch, 4 parts, has been applied to phagedenic chancres. Pyrogallol has the disadvantage of staining the skin and hair black. Stains upon the skin may be removed with ammonium persulphate. Pyrogallol is an ingredient of hair dyes, usually with silver nitrate or copper chloride; it is largely used as a developer in photography.

ACIDUM PYROGALLICUM OXIDATUM.—Oxidised pyrogallol is prepared by the action of air and ammonia on pyrogallol. It occurs as a dark brown powder which is slightly soluble in water, but insoluble in dehydrated alcohol and ether. It has been used, generally in the form of an ointment, plaster, or soap, as a substitute for pyrogallol, since it is less liable to set up inflammation or to cause toxic effects from absorption; it does not blacken the skin. Eye drops containing 1 in 200 to 1 in 1000 have been used with success in chronic conjunctivitis.

Preparations

Unguentum Pyrogallolis, B.P.C.—(Ung. Pyrogall.)—Pyrogallol Ointment. *Syn.*—Unguentum Acidi Pyrogallici; Pyrogallic Acid Ointment. Pyrogallol, 12·5 per cent., in white soft paraffin.

Unguentum Pyrogallolis Compositum, B.P.C.—(Ung. Pyrogall. Co.)—Compound Ointment of Pyrogallol. *Syn.*—Unguentum Acidi Pyrogallici Compositum; Compound Pyrogallic Acid Ointment; Unna's Compound Pyrogallol Ointment. Pyrogallol and ichthammol, of each 5 per cent., and salicylic acid, 2 per cent., in yellow soft paraffin.

PYROXYLINUM
(Pyroxylin.)

Pyroxylin

Pyroxylin is a nitrated cellulose prepared from defatted cotton wool by treatment with a mixture of nitric and sulphuric acids. It occurs as a white, felted mass of filaments, somewhat similar in appearance to cotton wool but harsher to the touch. It is highly inflammable. The properties of a nitrated cellulose are dependent upon the number of nitro-groups introduced into the cellulose molecule and this, in turn, is dependent upon the composition and concentration of the acids used in its preparation, the temperature, and the period during which the nitration is allowed to proceed. Slight differences in the conditions may result in a marked alteration in the viscosity of a collodion prepared from the resulting pyroxylin. In expressing the composition of nitrated cellulose, the cellulose molecule is usually given the arbitrary formula, $C_{12}H_{20}O_{10}$. On this notation, pyroxylin has approximately the composition of a cellulose tetranitrate, $C_{12}H_{16}O_6(ONO_2)_4$, and is completely soluble in a mixture of alcohol and ether. Nitrated celluloses containing more than 5 or less than $3\frac{1}{2}$ nitro-groups are incompletely soluble or insoluble in mixtures of alcohol and ether. Gun-cotton, which is cellulose hexanitrate, $C_{12}H_{14}O_4(ONO_2)_6$, may thus be distinguished from pyroxylin. Pyroxylin should be **stored** loosely packed, in a cool place, and protected from light. It may be kept moistened with industrial methylated spirit.

Soluble in a mixture of 1 volume of alcohol (90 per cent.) and 3 volumes of ether, yielding an almost clear and colourless solution; also soluble in acetone.

Standard, B.P.—Pyroxylin contains not less than 11·5 per cent. and not more than 12·3 per cent. of nitrogen, calculated on the dry substance. Viscosity at 20° of a 3 per cent. w/v solution of the dry substance in acetone, not less than 3 poises.

Action and Uses.—Pyroxylin is employed in the preparation of collodions and similar rapid-drying, protective varnishes. Collodium Acetonum, Collodium Flexile and Collodium Simplex are useful applications for chilblains, small cuts and abrasions, and as vehicles for the application of drugs such as salicylic acid, when prolonged action is required.

Preparations

Collodium Acetonum, B.P.C.—(Collod. Aceton.)—Acetone Collodion. Pyroxylin, 1 in 20, and oil of clove, in amyl acetate, benzene and acetone.

Collodium Flexile, B.P.—(Collod. Flex.)—Flexible Collodion. *Syn.*—Collodion. Pyroxylin, 2 per cent. w/v, with colophony and castor oil in alcohol (90 per cent.) or industrial methylated spirit suitably diluted, and ether.

Collodium Simplex, B.P.C.—(Collod. Simp.)—Simple Collodion. Pyroxylin, about 1 in 50, in ether and alcohol (90 per cent.).

This collodion was included in the British Pharmacopœia, 1914, under the name of Collodium.

QUASSIA
(Quass.)

Quassia

Synonyms—Quassiæ Lignum; Quassia Wood.

Quassia is the stem-wood of *Picræna excelsa* (Sw.) Lindl. (Fam. Simarubaceæ), a moderate-sized tree indigenous to Jamaica, and known in commerce as Jamaica quassia. The trunks and larger branches with the bark attached are exported in logs, which, for medicinal use, are freed from the bark, cut into chips, and dried.

Quassia occurs either in logs or, more usually, in chips or raspings. The wood has a density of about 0·54 to 0·56; it is yellowish-white or sometimes bright yellow, and tough, but easily split longitudinally, the grain being straight. The smoothed and moistened transverse surface, examined under a lens, shows numerous, narrow medullary rays, about 6 to 8 per millimetre of arc, traversing the diffuse porous wood, which is composed chiefly of fibres and parenchyma in interrupted tangential bands; true annual rings are absent. The drug is odourless and has an intensely bitter taste.

The diagnostic **microscopical** characters are the vessels with very numerous, minute bordered pits; the wood fibres with moderately thick, obliquely pitted walls; the wood-parenchyma, occurring mainly in interrupted tangential bands; the medullary rays, mostly two or three cells wide; the large, single, prismatic crystals of calcium oxalate in certain cells, both of the parenchyma and of the medullary rays; the presence of not more than a few starch grains, about 4 to 12 microns in diameter, mostly simple and spherical, or occasionally compound, with two components.

Quassia **contains** two homologous, crystalline, bitter principles, α-picrasmin and β-picrasmin (see Quassinum). The wood also contains a very small quantity of a third crystalline, bitter principle (melting-point, 234°), and a minute quantity of a yellow, crystalline substance which exhibits a blue fluorescence in an acidified alcoholic solution. Quassia yields to water from 4·5 to 6·5 per cent. of extractive.

Substitutes.—Surinam quassia, from *Quassia amara* Linn., is distinguished by the medullary rays which are mostly one cell wide and by the absence of calcium oxalate. Exhausted quassia may be differentiated by the lower yield of aqueous extractive and by the less bitter taste. Quassia wood showing greyish patches is wood which has been attacked by fungus.

Standard, B.P.—Quassia contains not more than 2 per cent. of foreign organic matter.

Quassia, in powder (Pulvis Quassiæ : Pulv. Quass.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Quassia is a non-astringent bitter. It is employed to increase the appetite. An infusion (1 in 20) is used as a rectal injection for thread-worms. Infusions are also employed as lotions for pediculosis. Quassia is best **administered** as an infusion,

thirty minutes before a meal. The tincture and extract are sometimes prescribed, the latter in pills. On account of its freedom from tannin, quassia may be given with salts of iron. A strong infusion of quassia painted on the skin keeps away small insects. Concentrated extracts, or preparations containing quassin, are also used as denaturants for alcohol, and, in conjunction with soft soap, as insecticides in horticulture.

Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

QUASSINUM.—Quassin, or picrasmin, may be obtained by exhausting quassia with 50 per cent. alcohol, neutralising with magnesia, making the solution acid with tartaric acid and removing the alcohol by distillation. The residue is shaken with chloroform, the solution evaporated to a syrupy consistence and the residue dissolved in dehydrated alcohol. The concentrated alcoholic solution is covered with a layer of ether, set aside to crystallise and the product recrystallised from alcohol. It is mainly a mixture of two homologous, crystalline, bitter principles, α-picrasmin, which melts at 204°, and β-picrasmin, which melts at from 209° to 212°. Quassin occurs in the form of white, odourless, crystalline needles or prisms. It has an extremely and persistently bitter taste. Quassin yields picrasmic acid on hydrolysis with hydrochloric acid. It may be removed from acid solutions by shaking with chloroform or benzene, but is not precipitated by lead acetate. Tannic acid precipitates the quassin from an alcoholic solution. It is soluble in water (about 1 in 1200), easily soluble in alcohol, soluble in chloroform (about 1 in 2) and benzene, slightly soluble in ether and light petroleum, soluble in caustic alkalis and in acid liquids. The bitter principle of *Quassia amara* is closely allied to, but not identical with, the quassin of *Picræna excelsa*; like the latter, it is a mixture of homologous, crystalline, bitter principles and yields quassic acid on hydrolysis with hydrochloric acid. A purified extract in the form of an amorphous, granular, sticky powder, yellowish-brown in colour, is also known commercially as quassin or dry extract of quassia.

Preparations

Extractum Quassiæ, B.P.C.—(Ext. Quass.)—Extract of Quassia. A soft extract. Dose.– 0·2 to 0·3 gramme (3 to 5 grains).

Infusum Quassiæ Concentratum, B.P.—(Inf. Quass. Conc.)—Concentrated Infusion of Quassia. Quassia, 1 in 12½, extracted with cold distilled water and preserved with alcohol. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of quassia, and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

A concentrated infusion, prepared with dilute chloroform water and alcohol (90 per cent.), was included in the British Pharmaceutical Codex, 1923.

Infusum Quassiæ Recens, B.P.—(Inf. Quass. Rec.)—Fresh Infusion of Quassia. 1 in 100. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Tinctura Quassiæ, B.P.—(Tinct. Quass.)—Tincture of Quassia. 1 in 10, by maceration in alcohol (45 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

QUEBRACHA

(Quebrach.)

Quebracho

Synonyms—Aspidosperma; Quebracho-blanco; White Quebracho.

Quebracho is the dried bark of *Aspidosperma Quebracho* Schlecht.

(Fam. Apocynaceæ), a large evergreen tree indigenous to the dry central and western districts of the Argentine and adjacent regions.

The bark occurs in nearly flat or slightly curved pieces about 6 to 18 centimetres long and 3 to 7 centimetres broad, and varying in thickness from 1·5 to 3 centimetres. The outer surface is reddish-brown or ashen, and has the appearance of being divided into roughly quadrangular, pentagonal, or hexagonal, very rugged islets, separated from one another by deep fissures; an occasional small group of lichens may be found attached to the bark, which also shows numerous minute, glistening points which are crystals of calcium oxalate. The inner surface is coarsely striated longitudinally, and varies in colour from light to dark brown, but it may sometimes be yellowish-white or occasionally of a rose-pink shade. The smoothed, transversely cut surface shows two sharply defined strata of about equal thickness, both of which are marked with numerous light-coloured dots and several tangential striæ; the fracture of the outer, brownish-coloured layer of rhytidome is rather coarsely granular, while that of the inner layer, which is of similar colour to the inner surface, is short and splintery. The drug has no odour, but a very bitter and somewhat aromatic taste.

The diagnostic **microscopical** characters are the large, isolated phloem fibres, about 0·5 to 1·2 millimetres long and 40 to 115 microns wide, each surrounded by a crystal sheath, giving the appearance of an incrustation, with prisms of calcium oxalate; the starch grains found throughout the parenchyma of the bark, mostly having 2 to 4 components, individual granules being up to 25 microns in diameter; the groups of stone cells from the phloem and medullary rays and the abundant cork cells.

Quebracho **contains** the alkaloids, aspidospermine, yohimbine (quebrachine), and quebrachamine. It also contains starch, tannin, quebrachitol and inositol.

Action and Uses.—Quebracho is a bitter and has been given as a tonic and febrifuge. It has a marked stimulant action on the respiratory centre in the medulla, and has been used in dyspnœa associated with cardiac or pulmonary disease; large doses may cause nausea and vomiting. It is usually **administered** in the form of tincture; a liquid extract (1 in 1) has also been prepared.

QUERCUS
(Querc.)
Oak Bark

Oak bark consists of the dried bark obtained from the smaller branches and young stems of the British oak, *Quercus Robur* Linn. and *Quercus sessiliflora* Salisb. (Fam. Fagaceæ), and is collected in the spring from trees growing in Great Britain.

The bark occurs in pieces about 25 millimetres wide, 2 millimetres thick and of varying length; the outer surface bears a glossy and silvery-grey cork, marked with occasional, faint, transverse, whitish lenticels, rarely bearing lichens. The inner surface is light brown to brownish-red, dull and coarsely striated. The fracture is fibrous. The smoothed transverse section, viewed under a lens, shows a thin cork or rhytidome, a narrow brownish cortex, a line of pericyclic fibres and stone cells, and, in the secondary phloem, delicate, tangential lines of sclerenchymatous fibres alternating with soft bast. The bark is without odour, and the taste is sweetish and afterwards astringent.

Oak bark **contains** 15 to 20 per cent. of quercitannic acid, $C_{17}H_{16}O_9$. It also contains a phlobaphene, oak red, which is produced from quercitannic acid by treatment with dilute sulphuric acid and may be regarded as its anhydride; gallic acid, ellagic acid, quercitol, lævulin, phloroglucinol and starch are also present.

Action and Uses.—Oak bark has astringent properties, but is now rarely used in medicine. It is sometimes employed as Decoctum Quercus as a rectal injection for hæmorrhoids and as a gargle for sore throats.

Preparation

Decoctum Quercus, B.P.C.—(Dec. Querc.)—Decoction of Oak Bark. About 1 in 15.

QUILLAIA
(Quill.)

Quillaia

Synonyms—Quillaiæ Cortex; Quillaia Bark; Soap Bark; Panama Bark.

Quillaia consists of the dried, inner part of the bark of *Quillaja Saponaria* Molina, a tree indigenous to Chile and Peru, and cultivated in India, and of other species of *Quillaja* (Fam. Rosaceæ).

Quillaia occurs in hard, tough, flat pieces up to about 1 metre in length, 10 to 15 or more centimetres in width and 3 to 10, usually about 6, millimetres thick. The outer surface is brownish-white, and bears occasional reddish or blackish-brown streaks or patches where the rhytidome has been incompletely removed; it is longitudinally striated or marked with a coarse, whitish reticulation. The inner surface is yellowish-white, smooth and very hard. The fracture is coarse and splintery, the fractured surface showing an evident lamination; numerous glistening, prismatic crystals of calcium oxalate are freely sprinkled upon the laminæ, and some are also visible upon the inner surface. The smoothed, transversely cut surface has a chequered appearance formed by alternating tangential bands of phloem parenchyma and phloem fibres across which run the radial medullary rays; the innermost layer appears more or less homogeneous. The drug is

odourless, but is strongly sternutatory when powdered; it has an acrid, astringent taste. The powdered drug forms a persistent froth when shaken with water.

The diagnostic **microscopical** characters are the bundles of phloem fibres, which are tortuous and irregularly enlarged at intervals; the occasional sub-rectangular sclereids; the abundant starch grains up to 20 microns, usually 5 to 10 microns, in diameter; the large crystals of calcium oxalate up to 170 microns long and up to 30 microns wide; the small amount of red-brown cork cells with red-brown contents.

Quillaia **contains** two colourless, amorphous, toxic glycosides, quillaic acid and quillaia-sapotoxin. These principles belong to the class of saponins (see Saponinum); they both impart to water the property of frothing, but the acrid taste and sternutatory effect are due to quillaia-sapotoxin alone. The bark also contains sucrose. It yields to alcohol (45 per cent.) from 30 to 40 per cent. of extractive.

Varieties.—The bark of *Quillaja Saponaria* shows externally longitudinal streaks and occasional patches of reddish-brown rhytidome; the bark said to be derived from *Q. Poeppigii* Walp. is usually thinner than the foregoing and is marked externally with a coarse, whitish reticulation; a thick bark, apparently from a species of *Quillaja,* is found in commerce and is very much thicker and somewhat softer in texture than that of *Q. Saponaria.*

Standard, B.P.—Quillaia contains not more than 2 per cent. of foreign organic matter. Ash, not more than 15 per cent.

Quillaia, in powder (Pulvis Quillaiæ : Pulv. Quill.), contains the constituents and possesses the diagnostic microscopical characters of Quillaia, and complies with the limit for ash of the unground drug.

Action and Uses.—Quillaia is an expectorant and, in large doses, an emetic, but is rarely given internally. Preparations of quillaia are employed for washing the skin and the scalp in the treatment of pediculosis. Tincture of quillaia is used as an emulsifying agent, especially for tar preparations and for small quantities of volatile oils. The powdered bark acts as a powerful sternutatory.

Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

Preparations

Extractum Quillaiæ Liquidum, B.P.C.—(Ext. Quill. Liq.)—Liquid Extract of Quillaia. 1 in 1.

Tinctura Quillaiæ, B.P.—(Tinct. Quill.)—Tincture of Quillaia. 1 in 20, by percolation with alcohol (45 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

QUINETUM
(Quinet.)

Quinetum

Quinetum, as defined by the Malaria Commission of the League of Nations in 1931, is a mixture of equal parts of quinine, cinchonidine

and cinchonine, these being approximately the relative proportions in which these alkaloids are present in the total alkaloids of red cinchona bark. It occurs as a white powder, which may show traces of crystalline structure, and gives off alkaline fumes when strongly heated. The name quinetum was originally used as a synonym for "cinchona febrifuge," which then consisted of the total alkaloids of the bark of *Cinchona succirubra*. With the gradual replacement of *C. succirubra* by species of *Cinchona* yielding bark richer in quinine, both quinetum and cinchona febrifuge have changed in character. Modern cinchona febrifuge consists of residual alkaloids left after the removal of the bulk of the quinine from the total alkaloids of those types of cinchona bark used for the manufacture of quinine sulphate. It varies greatly in composition and physical characters. The Malaria Commission of the League of Nations recommended that in countries where cinchona febrifuge is at present manufactured or used, the competent authority should bring the product to the totaquine standard by the addition of suitable amounts of crystalline cinchona alkaloids.

Partly **soluble** in ether, chloroform and cold alcohol; completely soluble in boiling alcohol and in acids.

Standard.—Quinetum, determined by the method of the British Pharmacopœia for Totaquina, yields not less than 60 per cent. of quinine and cinchonidine. Loss on drying at 100°, not more than 5 per cent. Ash, not more than 1 per cent.

Action and Uses.—Quinetum is administered by the mouth in the treatment of benign and malignant tertian malaria. It was introduced as a substitute for quinine, upon which to a great extent its action depends, and is superior to the more variable cinchona product known as "cinchona febrifuge."

Dose.– 0·06 to 0·6 gramme (1 to 10 grains).

QUINIDINA
(Quinidin.)

Quinidine

$$C_{20}H_{24}O_2N_2,2H_2O = 360{\cdot}2$$

Quinidine is an alkaloid, isomeric with quinine, obtained from the bark of many species of *Cinchona*. It occurs to the extent of about 0·2 per cent. in average stem and branch barks, but a somewhat higher proportion is found in root barks. It may be obtained from the mother liquors resulting from the manufacture of quinine sulphate by precipitating the alkaloids with sodium hydroxide, extracting with ether, shaking out the ethereal solution with dilute sulphuric acid, neutralising with sodium hydroxide and finally adding tartaric acid until no further precipitate is produced. The crude bitartrate of quinidine is further

purified by recrystallising from water, after decolourising with charcoal if necessary, and is then dissolved in water and the quinidine precipitated by ammonia, washed, and dried at a temperature of about 30°. The quinidine alkaloid so obtained is usually practically free from all the other cinchona alkaloids except hydroquinidine, a closely allied base of very similar chemical, physical and physiological properties, which is usually present to the extent of about 20 to 30 per cent.

Quinidine occurs as a white, amorphous powder or as acicular crystals, without odour, but having a very bitter taste. Its melting-point is about 168°. Its solutions in acids or organic solvents are dextrorotatory. Its solution in dilute sulphuric acid is fluorescent, and it yields a green colour when a slightly acid solution is treated with bromine followed by ammonia solution. Neutral solutions give a precipitate of sparingly soluble hydriodide on the addition of potassium iodide solution.

Almost **insoluble** in water (1 in 2000); soluble in alcohol (90 per cent.) (1 in 17) and ether (1 in 70). When anhydrous, it dissolves in about 1·6 parts of chloroform.

Standard.—Quinidine loses, on drying at 100°, not more than 10 per cent. of its weight. Ash, not more than 0·1 per cent. 1 gramme complies with the limit test for chlorides. 1 gramme complies with the limit test for sulphates. 0·05 gramme dissolved in 1 millilitre of sulphuric acid produces not more than a pale yellow colour (limit of readily carbonisable substances). When 0·5 gramme is neutralised with sulphuric acid and sufficient water added to produce 15 millilitres, the resulting solution complies with the limit test for other cinchona alkaloids in Quinidinæ Sulphas.

Action and Uses.—The action of quinidine in most respects resembles that of quinine; its depressant action on the heart, however, limits its use to some extent. It is said to be particularly active against the benign tertian form of malaria, although many authorities do not agree on this point. It is remarkable for its action upon the muscles of the auricles, and is consequently used for the control of auricular fibrillation; quinidine sulphate is generally administered for this purpose.

Dose.—0·2 to 0·6 gramme (3 to 10 grains).

QUINIDINÆ SULPHAS

(Quinidin. Sulph.)

Quinidine Sulphate

$(C_{20}H_{24}O_2N_2)_2,H_2SO_4,2H_2O = 782{\cdot}5$

Quinidine sulphate is the sulphate of the alkaloid, quinidine, found in the bark of various species of *Cinchona*. It occurs in the form of white,

acicular crystals, neutral or faintly alkaline to litmus, without odour, but having an intensely bitter taste. It becomes darker in colour on exposure to light. One molecule of water of crystallisation is lost at 100°, the second being lost at 120°. The dry salt re-absorbs two molecules of water on exposure to the air. The dilute aqueous solution acidified with sulphuric acid shows a strong blue fluorescence. Quinidine sulphate may be distinguished from the sulphates of most other alkaloids by the gradual formation of a white precipitate, soluble in nitric acid, on the addition of silver nitrate solution to a saturated aqueous solution. An emerald-green colouration is produced when the aqueous solution is treated with bromine water and dilute solution of ammonia as described under Quinina. Quinidine sulphate may be distinguished from quinine sulphate by the dextrorotation of its aqueous solution, and by the formation of a white precipitate on the addition of a solution of potassium iodide. It should be **stored** in well-closed containers and protected from light.

Soluble in water (about 1 in 90) and alcohol (90 per cent.) (1 in 10).

Standard, B.P.—Quinidine sulphate loses, on drying at 120°, not more than 5 per cent. of its weight. Ash, not more than 0·04 per cent. It complies also with a test for the absence of inorganic salts and other alkaloids, and with limit tests for readily carbonisable substances and other cinchona alkaloids.

Action and Uses.—Quinidine sulphate is employed in the treatment of auricular fibrillation. In this condition the auricles cease to contract rhythmically, and the auricular musculature is in a state of incoordinate and purposeless twitching. Consequently the ventricles do not receive the normal stimuli and they respond by rapid and irregular contractions; the cardiac output is thereby considerably diminished. Quinidine acts by prolonging the refractory period and by reducing the rate of conduction of impulses in the auricles. It tends to increase the ventricular rate by partial paralysis of the vagus. The rhythm of auricular fibrillation can be successfully altered in about 50 per cent. of cases by the administration of quinidine sulphate. In cases of congestive heart failure, digitalisation should precede the use of quinidine. Quinidine sulphate is most efficacious in the prevention of paroxysmal fibrillation and in early persistent fibrillation, as in cases with a toxic or infective origin such as Grave's disease and rheumatic fever; in cases of long standing, and those due to degenerative changes, its effect is doubtful. When fibrillation ceases, which may occur suddenly, the dose should be reduced, and when discontinued, a further course of digitalis should be administered. It may also be of value in auricular flutter and may prove beneficial in preventing and relieving paroxysmal tachycardia.

Occasionally quinidine produces unpleasant symptoms such as palpitation, headache, nausea, vomiting, dizziness, dimness of vision, scarlatiniform eruptions and precordial pain. It should be withheld when there is a history of embolism, or where there is cardiac hypertrophy, especially enlargement of the left ventricle or heart block.

Before a course of treatment is commenced, a preliminary dose of 0·3 gramme (5 grains) should be given; if there are no signs of idiosyncrasy, two doses can be given on the second day, and the number of doses should be increased in this way until the full dose of 2 grammes (30 grains) or more each day is being administered. If there is no improvement after treatment for ten days, quinidine should be discontinued since it is unlikely to be of any benefit. The change to normal rhythm occurs suddenly, and the dose should then be reduced gradually. It may be necessary to continue with daily doses of 0·3 to 0·6 gramme (5 to 10 grains) in order to maintain the normal rhythm. Quinidine sulphate is **administered** in gelatin capsules, in tablets, or in solution, with dilute sulphuric acid if necessary.

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

QUININA
(Quinin.)

Quinine

$C_{20}H_{24}O_2N_2,3H_2O = 378·3$

Quinine is the principal alkaloid of various species of *Cinchona*. It may be obtained from the powdered bark, in which it doubtless pre-exists in combination with quinic or cinchotannic acid, by mixing the powder with lime and extracting with alcohol or light petroleum; or by repeatedly boiling the bark with diluted sulphuric or hydrochloric acid and precipitating with solution of ammonia. The precipitate thus obtained is dissolved in 75 or 80 per cent. alcohol, neutralised with dilute sulphuric acid, and the alcohol distilled off. The resulting quinine sulphate, on crystallising, is separated from the mother-liquor, and repeatedly recrystallised from water, whereby the salt is freed from the sulphates of the other alkaloids. The solution of the quinine sulphate in dilute sulphuric acid is precipitated by ammonia, the curdy precipitate of the alkaloid first formed being amorphous and anhydrous, but subsequently changing in presence of ammonia and water into a minutely crystalline state with three molecules of water. It is washed, and dried at a low temperature.

Quinine occurs as a white, soft, flaky or granular powder, or as a microcrystalline powder consisting of minute, four-sided prisms terminated by pyramids, sometimes slightly damp from adhering moisture, without odour and having a bitter taste; it is slightly efflorescent in dry air. Its aqueous solution is lævorotatory, and is alkaline to litmus but not to phenolphthalein. Its solution in dilute sulphuric acid has a strong blue fluorescence, perceptible in a dilution of 1 in 200,000, which is destroyed by the halogen acids, thiosulphates and other substances. Quinine is a strong base, having an alkaline reaction in aqueous and alcoholic

solutions, neutralising the strongest acids and forming neutral and acid salts which for the most part crystallise well, their solutions tasting intensely bitter. At ordinary temperatures it gradually loses one molecule of water of crystallisation, and becomes anhydrous on standing over sulphuric acid. When anhydrous it melts at about 174°. On evaporating a chloroform solution and drying the residue at 100°, the anhydrous base is obtained. Quinine reacts with the usual alkaloidal reagents. The addition of 2 or 3 millilitres of bromine solution, followed by 1 millilitre of dilute solution of ammonia, to 1 millilitre of a 1 per cent. aqueous solution containing sufficient sulphuric acid to dissolve the base, produces an emerald-green colour. When 0·7 gramme is dissolved in a mixture of 15 millilitres of acetic acid, 6 millilitres of alcohol and 0·5 millilitre of sulphuric acid, the solution heated to boiling, and 7 millilitres of a saturated solution of iodine in alcohol added slowly, bronze or olive-green crystals of quinine iodosulphate separate on gradually cooling the solution; the crystals formed are insoluble in cold water. On heating with glycerin to about 180°, it is converted into the isomeric base, quinicine, which is amorphous and dextrorotatory. When quinine and its salts are examined for other cinchona alkaloids by the method of the British Pharmacopœia, accurate results may not be obtained unless the test is applied carefully and all the conditions closely observed.

Slightly **soluble** in water; soluble in alcohol (1 in 1), ether (1 in 4), chloroform (1 in 3), carbon disulphide, benzene, volatile and fixed oils, diluted acids, solution of ammonia, and to some extent in glycerin.

Standard.—Quinine loses, on drying at 100°, not more than 15 per cent. of its weight. Ash, not more than 0·05 per cent. 1 gramme complies with the limit test for chlorides. 1 gramme complies with the limit test for sulphates. 0·05 gramme dissolved in 1 millilitre of sulphuric acid or nitric acid is not coloured more than light yellow (limit of readily carbonisable substances). 1·1 grammes, dissolved in 20 millilitres of alcohol (90 per cent.), complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 20 millilitres of water and 1 millilitre of a 0·02 per cent. w/v solution of methyl red. . . ."

Action and Uses.—Quinine is a general protoplasmic poison and in sufficient concentration paralyses all forms of living matter. It is destructive to fresh-water amœbæ and spermatozoa, inhibits fermentation and retards the action of many unorganised ferments, such as pepsin and trypsin. It inhibits the action of oxydases, and to this property is attributed the remarkable power of quinine to diminish metabolism. The absorption of food is not affected, but the solids of the urine, and especially its nitrogenous constituents, are greatly reduced. Although protein metabolism is thus diminished, the absorption of oxygen and the elimination of carbonic acid are unaffected; there is therefore assumed to be a conservation in the body of nitrogenous material, which in the ordinary course would be oxidised, and would appear in the solids of the urine. Quinine, after absorption, tends to arrest the amœboid movements of the white blood corpuscles.

The use of the drug therefore tends to inhibit the formation of pus, but large doses are necessary to prevent suppuration. Quinine has long been supposed to exert an action on the uterus; large doses slightly increase uterine peristalsis, and it is sometimes used for the induction of labour at term.

Quinine is a specific in malaria. The malarial parasite is more susceptible to the action of quinine at some stages of its existence than at others, and the best results are obtained by the administration of the dose a few hours before the paroxysm, so that, allowing time for absorption, the quinine may be in greatest concentration in the blood at the time of the breaking up of the segmented organism into spores, which is coincident with the onset of fever. Quinine is sometimes used in fevers as an antipyretic; its action in reducing temperature is due to diminished heat production, not to augmented loss of heat. In acute fevers the lessened tissue destruction following the use of quinine is probably as important as the reduction of temperature. Many persons show a marked idiosyncrasy to quinine, and comparatively small doses may produce symptoms of "quinism," including giddiness, headache, humming noises in the ears, with deafness that may last a few hours, disturbances of vision, and sometimes erythematous or urticarial skin eruptions.

Quinine is usually **administered** in the form of the sulphate, hydrochloride, or hydrobromide. On account of its comparative insolubility in water, quinine alkaloid is almost tasteless and may be conveniently swallowed with milk.

Dose.– 0·06 to 0·6 gramme (1 to 10 grains).

Preparation

Oleinatum Quininæ, B.P.C.—(Oleinat. Quinin.)—Oleinate of Quinine. Quinine, 25 per cent. w/w, dissolved in oleic acid.

QUININÆ ACETYLSALICYLAS

(Quinin. Acetylsalicyl.)

Quinine Acetylsalicylate

$C_{20}H_{24}O_2N_2,C_9H_8O_4 = 504·3$

Quinine acetylsalicylate, $C_{20}H_{24}O_2N_2,C_6H_4(COOH)O{\cdot}OC{\cdot}CH_3$, may be prepared by mixing alcoholic solutions of quinine and acetylsalicylic acid. It occurs as a white, crystalline powder. Melting-point, about 157°.

Soluble in water (1 in 330), alcohol (1 in 50) and chloroform (1 in 7); insoluble in ether.

Standard.—Quinine acetylsalicylate yields not less than 63·5 per cent. of anhydrous quinine. Loss on drying at 100°, not more than

1 per cent. Ash, not more than 0·05 per cent. 1·5 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Assay.—Transfer about 0·5 gramme, accurately weighed, to a separator, add 10 millilitres of water and 5 millilitres of sodium hydroxide solution, and extract with successive portions of chloroform, washing each portion with 5 millilitres of water contained in a second separator; evaporate the combined chloroform solutions, add 5 millilitres of alcohol and again evaporate; dry the residue at 100°, and weigh.

Action and Uses.—The action of quinine acetylsalicylate resembles that of quinine salicylate and the compound is used for similar purposes.

Dose.—0·06 to 0·3 gramme (1 to 5 grains).

QUININÆ ARSENAS

(Quin. Arsen.)

Quinine Arsenate

$$(C_{20}H_{24}O_2N_2)_2,H_3AsO_4,8H_2O = 934{\cdot}5$$

Quinine arsenate may be prepared by dissolving quinine dihydrochloride and potassium arsenate in hot water, mixing the solutions, and boiling; after cooling, the precipitate is collected, washed with cold water and dried. Quinine arsenate occurs in white, silky needles.

Sparingly **soluble** in cold water; easily soluble in hot water.

Standard.—Quinine arsenate, determined by the method for Quininæ Acetylsalicylas, yields not less than 69 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 16 per cent. 1 gramme complies with the limit test for chlorides. 1 gramme complies with the limit test for sulphates. 1·4 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—Quinine arsenate is employed as an antiperiodic in malarial conditions. Its action is that of arsenic, since but little quinine is present in any dose which can be employed. It is best **administered** in pills. In cases of **poisoning** by quinine arsenate, the antidote recommended for Arsenii Trioxidum should be employed.

Dose.—0·004 to 0·008 gramme ($\frac{1}{16}$ to $\frac{1}{8}$ grain).

QUININÆ BENZOAS
(Quinin. Benz.)

Quinine Benzoate

$C_{20}H_{24}O_2N_2,C_7H_6O_2 = 446{\cdot}3$

Quinine benzoate, $C_{20}H_{24}O_2N_2,C_6H_5{\cdot}COOH$, may be prepared by mixing alcoholic solutions of quinine and benzoic acid. It occurs in small, white, prismatic crystals. The salt occurring in commerce is usually slightly basic, being alkaline in reaction and containing up to 75 per cent. of quinine.

Soluble in water (1 in 350) and alcohol.

Standard.—Quinine benzoate, determined by the method for Quininæ Acetylsalicylas, yields not less than 72 per cent. and not more than 75 per cent. of anhydrous quinine. Ash, not more than 0·1 per cent. 1 gramme complies with the limit test for chlorides. 1 gramme complies with the limit test for sulphates. 1·4 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—Quinine benzoate has the general properties of quinine salts, but it is not often used in medicine.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

QUININÆ BISULPHAS
(Quinin. Bisulph.)

Quinine Bisulphate

$C_{20}H_{24}O_2N_2,H_2SO_4,7H_2O = 548{\cdot}4$

Synonym—Quinine Acid Sulphate.

Quinine bisulphate is the acid sulphate of the alkaloid, quinine. It may be obtained by dissolving the calculated amount of quinine sulphate in dilute sulphuric acid on a water-bath at a temperature not exceeding 60°. The warm solution is filtered and set aside to crystallise. Quinine bisulphate contains the equivalent of about 59 per cent. of anhydrous alkaloid. It occurs in small, white, transparent or opaque, acicular crystals, without odour but with an intensely bitter taste. The crystals are efflorescent in dry air, and become yellowish on exposure to light. The aqueous solution shows a strong blue fluorescence, and is strongly acid to litmus but not to congo-red. Quinine bisulphate should be **stored** in well-closed containers and protected from light.

Soluble in water (about 1 in 10) and alcohol (90 per cent.) (1 in 23).

Standard, B.P.—Quinine bisulphate loses, on drying at 110°, not more than 24 per cent. of its weight. Ash, not more than 0·04 per cent. It complies also with limit tests for other cinchona alkaloids, and for readily carbonisable substances.

Action and Uses.—Quinine bisulphate has the general properties of quinine and is preferable to quinine sulphate for the preparation of tablets; 5 parts of the bisulphate are equivalent to about 4 parts of the sulphate. Solutions undergo decomposition when heated, and quinine bisulphate is therefore less suitable than the dihydrochloride and the dihydrobromide for the preparation of solutions of quinine for injection.

Dose.—0·06 to 0·6 gramme (1 to 10 grains).

QUININÆ CITRAS

(Quinin. Cit.)

Quinine Citrate

$(C_{20}H_{24}O_2N_2)_3,C_6H_8O_7,7\frac{1}{2}H_2O = 1300$

Quinine citrate is prepared by dissolving quinine in a hot solution of citric acid in water. It occurs in the form of white, acicular crystals, having only a slightly bitter taste.

Soluble in water (about 1 in 1000), boiling water (about 1 in 35), alcohol (about 1 in 70) and boiling alcohol (about 1 in 12); slightly soluble in chloroform.

Standard.—Quinine citrate, determined by the method for Quininæ Acetylsalicylas, yields not less than 74·5 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 10·5 per cent. Ash, not more than 0·1 per cent. 1·3 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—Quinine citrate has the general properties of quinine salts. It may be **administered** in the form of effervescent granules or pills, or suspended in water.

Dose.—0·06 to 0·3 gramme (1 to 5 grains).

QUININÆ FORMAS.—Quinine formate, $C_{20}H_{24}O_2N_2,CH_2O_2,H_2O$, occurs in white, crystalline, silky needles. Melting-point, about 126°. It is soluble in water (1 in 19) and alcohol.

QUININÆ DIHYDROBROMIDUM

(Quin. Dihydrobrom.)

Quinine Dihydrobromide

$C_{20}H_{24}O_2N_2,2HBr,3H_2O = 540{\cdot}1$

Synonyms—Quininæ Hydrobromidum Acidum; Quinine Acid Hydrobromide.

Quinine dihydrobromide may be prepared by dissolving quinine in hydrobromic acid. It occurs in the form of yellowish or white, prismatic crystals or powder. The aqueous solution is acid to litmus.

Soluble in cold water (1 in 7); very easily soluble in boiling water and alcohol.

Standard.—Quinine dihydrobromide, determined by the method for Quininæ Acetylsalicylas, yields not less than 59 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 11 per cent. Ash, not more than 0·1 per cent. 1 gramme complies with the limit test for sulphates. 0·2 gramme in 10 millilitres of water produces no turbidity with dilute sulphuric acid (limit of barium). 0·05 gramme dissolved in 1 millilitre of sulphuric acid is not coloured more than light yellow (limit of readily carbonisable substances). 1·7 grammes, shaken in a separator with 50 millilitres of water, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—Quinine dihydrobromide has the general properties of quinine salts. On account of its ready solubility, it is suitable for the preparation of solutions for injection in the treatment of malaria. Doses of 0·2 to 0·3 gramme (3 to 5 grains) dissolved in from 30 to 50 minims of sterilised water are injected daily. A solution for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. The acid salts of quinine when given in pill or capsule form, are more readily soluble in the stomach than the neutral salts. Quinine dihydrobromide is **incompatible** with potassium iodide.

Dose.– 0·06 to 0·6 gramme (1 to 10 grains).

Preparations

Syrupus Ferri Bromidi cum Quinina, B.P.C.—(Syr. Ferr. Brom. c. Quinin.)—Syrup of Ferrous Bromide with Quinine. Quinine dihydrobromide, 2 per cent. w/v, with dilute hydrobromic acid, distilled water and syrup of ferrous bromide; each fluid drachm contains about $1\frac{1}{10}$ grains of quinine dihydrobromide and 4 grains of ferrous bromide. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Syrupus Ferri Bromidi cum Quinina et Strychnina, B.P.C.—(Syr. Ferr. Brom. c. Quinin. et Strych.)—Syrup of Ferrous Bromide with Quinine and Strychnine. Strychnine, about 0·03 per cent. w/v, and quinine dihydrobromide, 2 per cent. w/v, with dilute hydrobromic acid, distilled water and syrup of ferrous bromide; each fluid drachm contains about $\frac{1}{64}$ grain of strychnine, $1\frac{1}{10}$ grains of quinine dihydrobromide and 4 grains of ferrous bromide. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

QUININÆ DIHYDROCHLORIDUM

(Quinin. Dihydrochlor.)

Quinine Dihydrochloride

$C_{20}H_{24}O_2N_2,2HCl = 397{\cdot}1$

Synonyms—Quininæ Hydrochloridum Acidum; Acid Quinine Hydrochloride; Quinine Acid Hydrochloride; Quinine Bihydrochloride.

Quinine dihydrochloride is the acid hydrochloride of the alkaloid quinine. It may be prepared by crystallisation from a solution of quinine in dilute hydrochloric acid. It occurs as a white, odourless, crystalline powder, with a very bitter taste, and contains the equivalent of about 81 per cent. of anhydrous alkaloid. The aqueous solution shows a blue fluorescence on the addition of dilute sulphuric acid; it is acid to litmus but not to congo-red. It should be **stored** in well-closed containers and protected from light.

Soluble in water (1 in 0·6), alcohol (90 per cent.) (1 in 12) and chloroform (1 in 7); insoluble in ether.

Standard, B.P.—Quinine dihydrochloride loses, on drying at 110°, not more than 3 per cent. of its weight. Ash, not more than 0·04 per cent. It complies also with limit tests for readily carbonisable substances, barium, other cinchona alkaloids and sulphate.

Action and Uses.—Quinine dihydrochloride is the salt of quinine which should be used for the preparation of solutions for intravenous or intramuscular injection. Injections of quinine dihydrochloride may be used in malaria, rheumatism, puerperal septicæmia, typhoid fever, or whenever quinine by the mouth causes gastric irritation. For intravenous injection, the strength of the solution should not exceed 2·5 per cent.; for intramuscular injection, solutions containing up to 30 per cent. of the salt are used. Subcutaneous injection is liable to be followed by fibrous induration. A solution for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Dose.—0·06 to 0·6 gramme (1 to 10 grains); 0·3 to 0·6 gramme (5 to 10 grains), by intravenous or intramuscular injection.

QUININÆ DISALICYLOSALICYLAS

(Quinin. Disalicylosalicyl.)

Quinine Disalicylosalicylate

$C_{20}H_{24}O_2N_2,C_{28}H_{20}O_{10} = 840{\cdot}4$

Synonym—Quinine Bisalicylosalicylate.

Quinine disalicylosalicylate, $C_{20}H_{24}O_2N_2,2C_6H_4(COOH){\cdot}O{\cdot}CO{\cdot}C_6H_4(OH)$, may be prepared by stirring a cold solution of 5·16 parts of salicylosalicylic acid in 50 parts of water containing 0·8 part of sodium

hydroxide into a cold solution of 5·48 parts of quinine bisulphate in 50 parts of water. The product is filtered, washed and dried, first at room temperature and then at a temperature gradually rising to, but not exceeding, 60°. It occurs as a white, microcrystalline powder, having only a slightly bitter taste.

Insoluble in water; soluble in alcohol (1 in 0·5) and ether (1 in 5).

Standard.—Quinine disalicylosalicylate, determined by the method for Quininæ Acetylsalicylas, contains not less than 38 per cent. and not more than 40 per cent. of anhydrous quinine. Melting-point, 86° to 88°. 2·5 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—Quinine disalicylosalicylate has the properties of quinine and salicylates. It has been recommended as a remedial agent for influenza.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

QUININÆ ET ÆTHYLIS CARBONAS

(Quinin. et Æthyl. Carb.)

Quinine Ethyl Carbonate

$C_{23}H_{28}O_4N_2 = 396·2$

Quinine ethyl carbonate, $C_{20}H_{23}O_2N_2 \cdot CO_2 \cdot C_2H_5$, may be obtained by the interaction of ethyl chlorocarbonate and quinine. It occurs in the form of white, slender, odourless and almost tasteless, crystalline needles, or in masses of silky, acicular crystals which are lighter than quinine sulphate. It darkens on exposure to light. The aqueous solution is slightly alkaline to litmus and, when acidified with sulphuric acid, exhibits a strong blue fluorescence; it gives an emerald-green colour when treated with bromine water and dilute solution of ammonia as described under Quinina. Quinine ethyl carbonate is hydrolysed by boiling dilute acids. When warmed with sodium hydroxide and solution of iodine, the odour of iodoform is evolved. It should be **stored** protected from light.

Slightly **soluble** in water; soluble in alcohol (90 per cent.) (1 in 2), ether and chloroform.

Standard, B.P.—Quinine ethyl carbonate has a melting-point not below 95°. Loss in weight on drying over sulphuric acid for twenty-four hours, not more than 2 per cent. Ash, not more than 0·04 per cent. It complies also with limit tests for chloride and sulphate.

Action and Uses.—Quinine ethyl carbonate, on account of its being almost tasteless, is employed as a substitute for quinine sulphate

or hydrochloride in whooping cough, influenza and malaria, especially in children. Solutions in acid or alcohol are much more bitter than the undissolved substance. It may be **administered** in powders, which are best given in milk or in cachets.

Dose.– 0·1 to 1 gramme (1½ to 15 grains).

QUININÆ ET UREÆ HYDROCHLORIDUM

(Quinin. et Urea. Hydrochlor.)

Quinine and Urea Hydrochloride

$C_{20}H_{24}O_2N_2,CH_4N_2O_2,2HCl,5H_2O = 547{\cdot}3$

Quinine and urea hydrochloride, $C_{20}H_{24}O_2N_2,HCl,CO(NH_2)_2,HCl,5H_2O$, is a compound of quinine hydrochloride and urea hydrochloride. It may be prepared by dissolving 400 parts of quinine hydrochloride in 300 parts of dilute hydrochloric acid of specific gravity 1·06, adding 60 to 61 parts of urea, warming the mixture until dissolved, filtering and crystallising. It occurs as white, odourless crystals or powder, having a bitter taste. Melting-point, about 72°, with loss of water. Its aqueous solution is acid to litmus and gives the thalleoquin reaction. A 0·1 per cent. w/v solution in dilute sulphuric acid shows a blue fluorescence. An equal volume of nitric acid, added to a 50 per cent. w/v aqueous solution of the salt cooled to 0°, produces, on standing, crystalline leaflets of urea nitrate.

Soluble in water (about 1 in 1); freely soluble in alcohol.

Standard.—Quinine and urea hydrochloride, determined by the method for Quininæ Acetylsalicylas, yields not less than 58 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 16·5 per cent. Ash, not more than 0·1 per cent. 0·05 gramme dissolved in 1 millilitre of sulphuric acid is not coloured more than light yellow (limit of readily carbonisable substances). 1·7 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—Quinine and urea hydrochloride is employed as a local anæsthetic. When injected hypodermically, the solution produces a marked anæsthetic action which is said to be equal to that produced by cocaine but more lasting, and may persist from four hours to several days. This renders it of particular value in operations on the anus and rectum, where the post-operative pain is often considerable. Anæsthesia may occur in from six to ten minutes, although sometimes as long as half an hour may elapse before the full effect is produced. Solutions of 0·5 to 1 per cent. w/v are employed; stronger solutions are liable to retard healing, owing to the formation

of fibrous tissue, and also to cause sloughing. In major operations on the abdominal region, large quantities of 0·2 to 0·5 per cent. w/v solution are used to infiltrate the nerves throughout the whole area of operation, and so produce complete nerve-block, preventing over-stimulation of the higher nerve centres and averting the onset of surgical shock. This is known as Crile's method of anoci-association.

The deep intramuscular injection of 5 millilitres (75 minims) of a 1 per cent. w/v solution in the centre of the painful area has given rapid relief and apparent cure in acute lumbago. The same method of treatment has been used with success in the treatment of sciatica, intercostal neuralgia, brachial neuritis, etc. A 5 per cent. w/v solution has been used for the injection of internal hæmorrhoids. A few minims may be injected directly into the pile or, alternatively, the whole area of the rectal mucous membrane may be treated by submucous injection, as much as 5 millilitres (75 minims) being used if required. The method should not be used for external sloughing, or strangulated hæmorrhoids, or when there is any local infection of the ano-rectal region. A solution of the same strength is used also in the treatment of anal fissure, 0·25 millilitre (4 minims) being injected superficially under the external half of the fissure. A fine, sharp needle must be used, and the injection made rapidly, since it is painful. Further injections may be necessary at intervals of two to three days. After treatment, undiluted ichthammol is applied to the surface. In pruritus of the anus, vulva, or scrotum, the affected parts may be infiltrated with a solution of quinine and urea hydrochloride, 0·25 to 0·5 per cent. w/v. The area should first be treated with an efficient antiseptic, and anæsthetised by injecting a 1 per cent. w/v solution of procaine hydrochloride. The injection of 4 to 8 millilitres (60 to 120 minims) of a 4 per cent. w/v solution is said to cause a reduction in the size of the enlarged thyroid gland in goitre. The sclerosing action of quinine and urea hydrochloride solution has been used in place of electro-cautery to treat vascular hypertrophy of the inferior turbinates. An injection of 2 to 3 millilitres (30 to 45 minims) of a 5 per cent. solution is made into the connective tissue, and a reduction in size takes place in eight to ten days.

Since solutions of quinine and urea hydrochloride do not readily penetrate mucous membrane, the compound is of limited value when applied locally, although strong solutions (10 to 20 per cent. w/v or stronger) have been applied locally in tonsillitis, tuberculosis of the larynx and other painful throat affections. Suppositories containing 0·2 to 0·3 gramme (3 to 5 grains) and ointment (20 per cent.) are used in the treatment of hæmorrhoids, fissure and other painful affections of the rectum. An ointment containing 1 per cent. of quinine and urea hydrochloride is used as an application to burns over large areas. Quinine and urea hydrochloride may also be employed for the therapeutic action of quinine. It is particularly suitable for intramuscular injection because of the freedom from pain and irritation. Strong solutions, however, are likely to cause local destruction of tissue, as do similar solutions of

other quinine salts. A solution of quinine and urea hydrochloride for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Dose.—0·03 to 1 gramme ($\frac{1}{2}$ to 15 grains), by injection.

QUININÆ GLYCEROPHOSPHAS

(Quinin. Glycerophosph.)

Quinine Glycerophosphate

$(C_{20}H_{24}O_2N_2)_2,C_3H_9O_6P,4H_2O = 892·6$

Quinine glycerophosphate may be prepared by mixing a solution of calcium glycerophosphate in water with a solution of quinine hydrochloride in water, washing the resulting precipitate with a little cold water, draining and drying. It occurs in the form of fine, white, crystalline needles, or as a white, crystalline powder which is odourless and bitter, but not so intensely bitter as quinine sulphate. When anhydrous, it melts at 154°.

Soluble in water (about 1 in 200), boiling water (1 in 100), alcohol (1 in 40) and glycerin; easily soluble in boiling alcohol; insoluble in ether.

Standard.—Quinine glycerophosphate, determined by the method for Quininæ Acetylsalicylas, yields not less than 70 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 8·5 per cent. 1·4 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—Quinine glycerophosphate has the general properties of quinine salts, and may be **administered** in cachets or capsules.

Dose.—0·06 to 0·6 gramme (1 to 10 grains).

QUININÆ HYDRIODIDUM

(Quinin. Hydriod.)

Quinine Hydriodide

$C_{20}H_{24}O_2N_2,HI = 452·1$

Quinine hydriodide may be prepared by precipitating a solution of quinine hydrochloride in hot water with a solution of potassium iodide in water. The precipitate is washed, and dried at a gentle heat. It

occurs in the form of pale yellow crystals or powder. It should be **stored** in the dark.

Slightly **soluble** in water; freely soluble in hot water, alcohol and ether.

Standard.—Quinine hydriodide, determined by the method for Quininæ Acetylsalicylas, yields not less than 71 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 1 per cent. Ash, not more than 0·5 per cent. 1·4 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—Quinine hydriodide has been given for tuberculosis and chronic rheumatism. It is best **administered** in cachets.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

QUININÆ DIHYDRIODIDUM.—Quinine dihydriodide (Quininæ Hydriodidum Acidum, quinine acid hydriodide), $C_{20}H_{24}O_2N_2,2HI,5H_2O$, may be prepared by adding a solution of potassium iodide to a warm solution of quinine in dilute sulphuric acid, and crystallising. It occurs in the form of yellowish crystals or scales. On heating, the crystals become opaque at 30° and melt at 100° in their water of crystallisation, becoming completely anhydrous at 120°; when the anhydrous salt is exposed to a damp atmosphere it takes up two molecules of water. It should be stored in the dark. Quinine dihydriodide is soluble in water (1 in 20). Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

QUININÆ HYDROBROMIDUM

(Quinin. Hydrobrom.)

Quinine Hydrobromide

$C_{20}H_{24}O_2N_2,HBr,2H_2O = 441·2$

Quinine hydrobromide may be prepared by the double decomposition of quinine sulphate and barium bromide, or by neutralising dilute hydrobromic acid with quinine. It occurs in the form of light, white, silky, acicular, odourless, efflorescent crystals, having a bitter taste. The aqueous solution is neutral or very slightly alkaline to litmus, and is non-fluorescent.

Soluble in water (about 1 in 55), boiling water (1 in 1), alcohol (1 in 0·7), chloroform (1 in 10) and glycerin.

Standard.—Quinine hydrobromide, determined by the method for Quininæ Acetylsalicylas, yields not less than 73 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 9 per cent. Ash, not more than 0·1 per cent. 1 gramme complies with the limit test for sulphates. 0·2 gramme in 12 millilitres of water produces no turbidity with dilute sulphuric acid (limit of barium). 0·05 gramme dissolved in 1 millilitre of sulphuric acid is not coloured more than light yellow

(limit of readily carbonisable substances). 1·3 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—The amount of hydrobromic acid present in this salt is insufficient to produce any bromide action. When given with a medicinal dose of hydrobromic acid, quinine is found to produce symptoms of quinism less often, and the sedative action of the mixture is useful in neuralgia and acute rheumatism. Quinine hydrobromide is used with dilute hydrobromic acid for the treatment of exophthalmic goitre. It may be **administered** in tablets, or in mixtures suspended with compound powder of tragacanth. In tablet making, quinine hydrobromide is more easily manipulated and produces a more satisfactory and soluble product than quinine sulphate.

Dose.– 0·06 to 0·6 gramme (1 to 10 grains).

QUININÆ HYDROFLUORIDUM.—Quinine hydrofluoride, $C_{20}H_{24}O_2N_2,HF$, occurs as colourless crystals or as a white, amorphous powder. It is insoluble in water, but soluble in alcohol. Quinine hydrofluoride has been recommended for use in exophthalmic goitre. Dose.– 0·06 to 0·12 gramme (1 to 2 grains).

QUININÆ HYDROCHLORIDUM

(Quinin. Hydrochlor.)

Quinine Hydrochloride

$$C_{20}H_{24}O_2N_2,HCl,2H_2O = 396{\cdot}7$$

Quinine hydrochloride is the hydrochloride of the alkaloid quinine. It may be prepared by double decomposition of barium chloride and quinine sulphate. It occurs in the form of white, silky, glistening, acicular, odourless crystals, usually larger than those of quinine sulphate, efflorescent in warm air, and having a very bitter taste. It contains the equivalent of about 82 per cent. of anhydrous alkaloid. On exposure to light it gradually becomes yellowish in colour. The aqueous solution is lævorotatory, and is neutral or faintly alkaline to litmus. The concentrated aqueous solution shows no fluorescence, but on considerable dilution a slight fluorescence is perceptible which increases on addition of sulphuric acid and disappears on the addition of hydrochloric acid.

Soluble in water (1 in 32), and alcohol (90 per cent.) (1 in 2).

Standard, B.P.—Quinine hydrochloride loses, on drying at 110°, not more than 10 per cent. of its weight. Ash, not more than 0·04 per cent. The 4 per cent. w/v aqueous solution is not fluorescent. It complies also with limit tests for readily carbonisable substances, inorganic salts and other alkaloids, barium, other cinchona alkaloids, and sulphate.

Action and Uses.—Quinine hydrochloride has the properties of quinine; it is more soluble and more readily absorbed than quinine sulphate, and is less irritating to the gastric mucosa. It is also employed in the form of pessaries, 0·2 to 0·3 gramme (3 to 5 grains) in each, with oil of theobroma, in leucorrhœa, and as a contraceptive. In conjunction with urethane as Injectio Quininæ et Urethani, it is used as a sclerosing agent in the treatment of varicose veins. It may be **administered** in cachets, tablets, and in solution in mixtures. A solution for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·06 to 0·6 gramme (1 to 10 grains).

Preparations

Injectio Quininæ et Urethani, B.P.C.—(Inj. Quinin. et Urethan.)—Injection of Quinine and Urethane. A sterile aqueous solution containing quinine hydrochloride, about 13·5 per cent. w/v, and urethane, about 6·5 per cent. w/v. Dose.– 5 millilitres (75 minims), by intravenous injection.

Tinctura Quininæ, B.P.C.—(Tinct. Quinin.)—Tincture of Quinine. Quinine hydrochloride, 1 in 50, in tincture of orange. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

Vinum Quininæ, B.P.C.—(Vin. Quinin.)—Quinine Wine. Quinine hydrochloride dissolved in orange wine; each fluid ounce contains 1 grain of quinine hydrochloride. Dose.– 16 to 30 millilitres (½ to 1 fluid ounce).

This wine was included in the British Pharmacopœia, 1914.

QUININÆ HYPOPHOSPHIS

(Quinin. Hypophosph.)

Quinine Hypophosphite

$C_{20}H_{24}O_2N_2,H_3PO_2,2H_2O = 426·3$

Quinine hypophosphite may be obtained by dissolving quinine in hypophosphorous acid. It occurs as a colourless, crystalline salt, consisting of very small prisms, or as an amorphous powder. A solution in water acidified with dilute sulphuric acid produces a red precipitate with copper sulphate solution.

Soluble in water (1 in 24) and alcohol (1 in 40).

Standard.—Quinine hypophosphite, determined by the method for Quininæ Acetylsalicylas, yields not less than 74 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 9 per cent. 1 gramme complies with the limit tests for chlorides. 1 gramme complies with the limit tests for sulphates. 0·2 gramme in 10 millilitres of water produces no turbidity with dilute sulphuric acid (limit of barium). 0·05 gramme dissolved in 1 millilitre of sulphuric acid is not coloured more than light yellow (limit of readily carbonisable substances). 1·3 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test

of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—The action of quinine hypophosphite is similar to that of other quinine salts. It is sometimes used in the preparation of hypophosphite syrups.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

QUININÆ LACTAS

(Quinin. Lact.)

Quinine Lactate

$C_{20}H_{24}O_2N_2,C_3H_6O_3 = 414{\cdot}3$

Quinine lactate, $C_{20}H_{24}O_2N_2,CH_3{\cdot}CHOH{\cdot}COOH$, may be prepared by adding quinine to hot water and neutralising with lactic acid. It occurs in the form of anhydrous, colourless, prismatic needles resembling quinine sulphate in appearance, or as a white, crystalline or granular, amorphous powder.

Soluble in water (about 1 in 6) and boiling water (1 in less than 1); very soluble in alcohol; nearly insoluble in ether.

Standard.—Quinine lactate, determined by the method for Quininæ Acetylsalicylas, yields not less than 72 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 3 per cent. Ash, not more than 0·1 per cent. 1·3 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—Quinine lactate has the general properties of other quinine salts, but it is not often used in medicine.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

QUININÆ PHOSPHAS

(Quinin. Phosph.)

Quinine Phosphate

$(C_{20}H_{24}O_2N_2)_3,2H_3PO_4,6H_2O = 1277$

Quinine phosphate may be prepared by suspending 10 parts of quinine in about 50 parts of hot water and adding sufficient phosphoric acid to give a solution just faintly acid to litmus. The solution is filtered while hot and allowed to crystallise. It occurs as white or slightly brownish, acicular crystals, similar to quinine sulphate but harder and denser.

Very slightly **soluble** in water (1 in 850) and chloroform (about 1 in 900); soluble in alcohol (90 per cent.) (1 in 110); insoluble in ether.

Standard.—Quinine phosphate, determined by the method for Quininæ Acetylsalicylas, yields not less than 74 per cent. and not more than 78 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 10 per cent. 1 gramme complies with the limit test for chlorides. 1 gramme complies with the limit test for sulphates. 1·3 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—The action of quinine phosphate is similar to that of other quinine salts. It is **administered** in tablets, and is sometimes used in the preparation of phosphate syrups.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

QUININÆ SALICYLAS

(Quinin. Salicyl.)

Quinine Salicylate

$C_{20}H_{24}O_2N_2,C_7H_6O_3,H_2O = 480·3$

Quinine salicylate, $C_{20}H_{24}O_2N_2,C_6H_4(OH)\cdot COOH,H_2O$, may be prepared by the interaction of sodium salicylate and quinine sulphate in aqueous solution. It occurs in the form of white, silky, acicular crystals, or as a crystalline powder, assuming a pinkish colour on keeping. The aqueous solution is alkaline to litmus.

Very slightly **soluble** in water; soluble in alcohol (1 in 24) and chloroform (1 in 25).

Standard.—Quinine salicylate, determined by the method for Quininæ Acetylsalicylas, yields not less than 67 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 4 per cent. Ash, not more than 0·1 per cent. 1·4 grammes, shaken in a separator with 50 millilitres of water containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—Quinine salicylate is sometimes employed at the onset of influenza, to abort the common cold, and as an analgesic in neuralgia and sciatica. It is **administered** in cachets, tablets, or pills, or suspended in water with compound powder of tragacanth. It is **incompatible** with mineral acids.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

Preparation

Mistura Quininæ Salicylatis, B.P.C.—(Mist. Quinin. Salicyl.)—Mixture of Quinine Salicylate. Each fluid ounce contains 30 minims of ammoniated solution of quinine, 10 grains of potassium citrate and 10 grains of sodium salicylate, with glycerin and infusion of gentian. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

QUININÆ SULPHAS

(Quinin. Sulph.)

Quinine Sulphate

$(C_{20}H_{24}O_2N_2)_2,H_2SO_4,7\frac{1}{2}H_2O = 881{\cdot}6$

Quinine sulphate is the sulphate of the alkaloid quinine, and is obtained from the bark of various species of *Cinchona* as described under Quinina. It occurs as white, odourless, flexible, silky crystals, with a persistent, intensely bitter taste. It contains the equivalent of from about 73·5 to about 76·5 per cent. of anhydrous alkaloid. It is rapidly efflorescent in dry air or when heated to 50°, and loses 5½ molecules of water of crystallisation, becoming lustreless. It becomes anhydrous when heated at 100°, and the anhydrous salt takes up moisture on exposure to air, forming the stable dihydrated compound. The aqueous solution is neutral or weakly alkaline to litmus. It may be distinguished from quinidine sulphate by the lævorotation of the aqueous solution. The alkaloid is precipitated from solutions of the sulphate by alkalis and alkali carbonates, but is slightly soluble in excess of solution of ammonia. It should be **stored** in well-closed containers and protected from light.

Soluble in water (1 in 800), boiling water (about 1 in 30), alcohol (90 per cent.) (1 in 65), boiling alcohol (90 per cent.) (1 in 6); almost insoluble in ether and chloroform; readily soluble in a mixture of 2 parts of chloroform and 1 part of dehydrated alcohol.

Standard, B.P.—Quinine sulphate loses, on drying at 100°, not less than 11 per cent. and not more than 16 per cent. of its weight. Ash, not more than 0·04 per cent. It complies also with limit tests for readily carbonisable substances, inorganic salts and other alkaloids, and other cinchona alkaloids.

Action and Uses.—Quinine sulphate has the general properties of quinine, and is the most commonly used salt of quinine, although for general purposes the hydrochloride or hydrobromide is sometimes preferred. Large doses are given in malarial and intermittent fevers, and smaller doses in continued fevers and neuralgia, and as a tonic to improve the appetite. For external use, 0·5 per cent. w/v solutions are employed as a spray or nasal douche in hay fever; for corneal ulcers, 0·2 per cent. w/v solutions are used. The salt is dissolved with a minimum of dilute sulphuric acid, or preferably the acid sulphate is employed.

Quinine sulphate may be **administered** mixed with milk, or in cachets or pills, or as a mixture, suspended with compound powder of tragacanth or dissolved with acid. 1 grain of quinine sulphate is rendered soluble in distilled water by 1 minim of dilute sulphuric acid or 2 minims of dilute phosphoric acid; the acid should in each case be diluted with from six to ten times its bulk of water before adding the quinine salt. It should not be dissolved by the addition of acid unless so ordered. Quinine sulphate is **incompatible** with alkalis and their carbonates, iodides, tannic acid and mercuric chloride. These substances precipitate the alkaloid or form insoluble salts which become adherent to the sides of the bottle; the addition of mucilage of acacia usually keeps the precipitated alkaloid in a diffusible condition. It is not suitable for the preparation of hypodermic injections; the dihydrobromide and dihydrochloride are used for this purpose.

Dose.– 0·06 to 0·6 gramme (1 to 10 grains).

Preparations

Capsulæ Quininæ Ammoniatæ, B.P.C.—(Caps. Quinin. Ammon.)—Capsules of Ammoniated Quinine. Each capsule contains quinine sulphate and ammonium bicarbonate and s approximately equivalent to 1 fluid drachm of solution of ammoniated quinine. Dose.– 1 capsule.

Capsulæ Quininæ Ammoniatæ et Cinnamomi, B.P.C.—(Caps. Quinin. Ammon. et Cinnam.)—Capsules of Ammoniated Quinine and Cinnamon. Each capsule contains quinine sulphate, ammonium bicarbonate and oil of cinnamon, and is approximately equivalent to 1 fluid drachm of solution of ammoniated quinine with ¼ minim of oil of cinnamon. Dose.– 1 capsule.

Capsulæ Quininæ et Cinnamomi, B.P.C.—(Caps. Quinin. et Cinnam.)—Capsules of Quinine and Cinnamon. Each capsule contains 1 grain of quinine sulphate and 1 minim of oil of cinnamon. Dose.– 1 capsule.

Elixir Quininæ Ammoniatum et Cinnamomi, B.P.C.—(Elix. Quinin. Ammon. et Cinnam.)—Ammoniated Elixir of Quinine and Cinnamon. Each fluid drachm contains about 1 grain of quinine sulphate with oil of cinnamon, ammonium carbonate, strong solution of ammonia, spirit of chloroform, syrup of orange, alcohol (90 per cent.), solution of cochineal and distilled water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Liquor Quininæ Ammoniatus, B.P.—(Liq. Quinin. Ammon.)—Ammoniated Solution of Quinine. *Syn.*—Tinctura Quininæ Ammoniata; Ammoniated Tincture of Quinine. It contains 2 per cent. w/v of quinine sulphate (limits, 1·9 to 2·1) and 1 per cent. w/v of NH_3 (limits, 0·9 to 1·05) in alcohol (60 per cent.). 4 millilitres contains 0·08 gramme, and 1 fluid drachm contains about 1 grain, of quinine sulphate. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Liquor Quininæ et Strychninæ, B.P.C.—(Liq. Quinin. et Strych.)—Solution of Quinine and Strychnine. It contains quinine sulphate equivalent to from 8·5 to 9·0 per cent. w/v of anhydrous quinine, and strychnine hydrochloride equivalent to from 0·186 to 0·206 per cent. w/v of strychnine, with hypophosphorous acid, glycerin and water. A syrup differing from Syrupus Ferri Phosphatis cum Quinina et Strychnina B.P. only in the presence of 0·75 per cent. v/v of hypophosphorous acid may be made by mixing 1 fluid ounce of this solution, 1 fluid ounce of solution of ferrous phosphate, ½ fluid ounce of glycerin and 1 fluid ounce of distilled water with sufficient syrup to produce 8 fluid ounces.

Pilulæ Ferri Phosphatis cum Quinina et Strychnina, B.P.C.—(Pil. Ferr. Phosph. c. Quinin. et Strych.)—Iron Phosphate Pills with Quinine and Strychnine. *Syn.*—Pilulæ Trium Phosphatum; Easton's Pills; Pilulæ Ferri et Quininæ et Strychninæ Phosphatum. Each pill contains $1\frac{1}{2}$ grains of saccharated iron phosphate, about $\frac{1}{2}$ grain of quinine sulphate and $\frac{1}{120}$ grain of strychnine hydrochloride and is approximately equivalent to $\frac{1}{2}$ fluid drachm of syrup of ferrous phosphate with quinine and strychnine. Dose.– 1 or 2 pills.

Pilulæ Podophyllini et Quininæ, B.P.C.—(Pil. Podoph. et Quinin.)—Podophyllin and Quinine Pills. *Syn.*—Poore's Pills. Each pill contains $\frac{1}{12}$ grain of resin of podophyllum, 1 grain of quinine sulphate, $\frac{1}{8}$ grain of extract of belladonna and 1 grain of aloes. Dose.– 1 pill.

Pilulæ Quininæ Sulphatis, B.P.C.—(Pil. Quinin. Sulph.)—Quinine Sulphate Pills. *Syn.*—Pilulæ Quininæ; Quinine Pills. Each pill contains 2 grains of quinine sulphate. Dose.– 1 to 4 pills.

The mass with which these pills are made contains approximately the same proportion of quinine sulphate as Pilula Quininæ Sulphatis of the British Pharmacopœia, 1914, which was prepared with quinine sulphate, 82 grammes; tartaric acid, 3 grammes; tragacanth, 3 grammes; glycerin, 12 grammes.

Syrupus Ferri Phosphatis cum Quinina et Strychnina, B.P.— (Syr. Ferr. Phosph. c. Quinin. et Strych.)—Syrup of Ferrous Phosphate with Quinine and Strychnine. *Syn.*—Easton's Syrup. It contains iron equivalent to 1·8 per cent. w/v of anhydrous ferrous phosphate, $Fe_3(PO_4)_2$ (limits, 1·62 to 1·98), 1·09 per cent. w/v of anhydrous quinine (limits, 1·04 to 1·2), and 0·0246 per cent. w/v of strychnine (limits, 0·022 to 0·027), with syrup, glycerin and distilled water. 4 millilitres contains the equivalent of 0·072 gramme of anhydrous ferrous phosphate or about 0·034 gramme of iron, about 0·059 gramme of quinine sulphate, and about 0·0012 gramme of strychnine hydrochloride; 1 fluid drachm contains the equivalent of about 1 grain of anhydrous ferrous phosphate or about $\frac{1}{2}$ grain of iron, about $\frac{1}{4}$ grain of quinine sulphate and about $\frac{1}{60}$ grain of strychnine hydrochloride. The proportion of strychnine is approximately one half the proportion of strychnine contained in the corresponding preparation of the British Pharmacopœia, 1914. It should be stored in completely-filled, well-closed containers and protected from light. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Tabellæ Ferri Phosphatis cum Quinina et Strychnina, B.P.C.—(Tab. Ferr. Phosph. c. Quinin. et Strych.)—Tablets of Ferrous Phosphate with Quinine and Strychnine. *Syn.*—Tabellæ Trium Phosphatum; Easton's Tablets; Tabellæ Eastonii; Tabellæ Ferri et Quininæ et Strychninæ Phosphatum. Each tablet contains about $2\frac{1}{2}$ grains of saccharated iron phosphate, $\frac{1}{8}$ grain of quinine sulphate and about $\frac{1}{60}$ grain of strychnine hydrochloride, and is approximately equivalent to 1 fluid drachm of syrup of ferrous phosphate with quinine and strychnine. Dose.– 1 tablet.

Tinctura Antiperiodica, B.P.C.—(Tinct. Antiperiod.)—Antiperiodic Tincture. *Syn.*—Warburg's Tincture. Aloes, about 1 in 40, quinine sulphate, 1 in 50, with rhubarb, angelica fruit, elecampane, saffron, fennel, chalk, gentian, cubeb, myrrh, agaric, opium, black pepper, cinnamon, ginger, zedoary and camphor. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

QUININÆ TANNAS

(Quinin. Tann.)

Quinine Tannate

Quinine tannate is the tannic acid compound of the alkaloid quinine. It may be prepared by the interaction of solutions of quinine sulphate

and tannic acid in the presence of ammonia. It occurs as a pale yellow or yellowish-white, amorphous powder, with an astringent taste which is not more than slightly bitter. When heated, it melts to a viscid, purplish mass. The saturated alcoholic solution gives a blue-black colouration on the addition of ferric chloride solution. It should be **stored** in well-closed containers and protected from light.

Slightly **soluble** in cold water; soluble in boiling water (about 1 in 30) and alcohol (90 per cent.) (about 1 in 3).

Standard, B.P.—Quinine tannate contains not less than 30 per cent. and not more than 35 per cent. of anhydrous quinine. Loss on drying at 100°, not more than 10 per cent. Ash, not more than 0·3 per cent. It complies also with limit tests for free quinine, other cinchona alkaloids, heavy metals, chloride and sulphate.

Action and Uses.—Quinine tannate is especially useful for children on account of its comparative freedom from bitterness. It is not less active than the more soluble quinine salts, and being absorbed only slowly is much more easily tolerated. It has been used especially in whooping cough and malaria. It is best **administered** in milk, or in tablets prepared with a chocolate basis.

Dose.– 0·1 to 1 gramme (1½ to 15 grains).

QUININÆ VALERIANAS

(Quinin. Valer.)

Quinine Valerianate

$C_{20}H_{24}O_2N_2,C_5H_{10}O_2,H_2O = 444{\cdot}3$

Quinine valerianate, $C_{20}H_{24}O_2N_2,C_4H_9{\cdot}COOH,H_2O$, may be prepared by the interaction of quinine and valerianic acid. It occurs in the form of colourless, lustrous, pearly crystals, or as a white, microcrystalline powder, having a slight odour of valerianic acid and a bitter taste. Melting-point, about 90°, forming a colourless liquid. At 100° it loses its water of crystallisation and at the same time begins to lose valerianic acid.

Soluble in water (1 in 120), boiling water (1 in 40), alcohol (1 in 2) and ether (1 in 14).

Standard.—Quinine valerianate, determined by the method for Quininæ Acetylsalicylas, yields not less than 71 per cent. of anhydrous quinine. Ash, not more than 0·1 per cent. 1·4 grammes shaken in a separator with 50 millilitres of water, containing 5 millilitres of dilute sulphuric acid, complies with the test of the British Pharmacopœia for other cinchona alkaloids in Quininæ Hydrochloridum, commencing with the words "add 5 millilitres of dilute solution of ammonia. . . ."

Action and Uses.—Quinine valerianate is employed with the valerianates of iron and zinc in neurotic conditions and hysteria. It is **administered** in capsules or pills.

Dose.—0·06 to 0·2 gramme (1 to 3 grains).

Preparation

Pilulæ Ferri Valerianatis Compositæ, B.P.C.—(Pil. Ferr. Valer. Co.)—Compound Iron Valerianate Pills. *Syn.*—Pilulæ Trium Valerianatum. Each pill contains 1 grain each of the valerianates of iron, quinine and zinc. Dose.—1 or 2 pills.

RADIUM
(Radium)

Radium

$Ra = 226·0$

Radium is a disintegration product of uranium and is therefore found in all uranium minerals, such as pitchblende, which contains about 80 per cent. of uranium oxide, U_3O_8, carnotite, potassium uranyl vanadate, $K(UO_2)VO_4,1\frac{1}{2}H_2O$, etc. The ratio of radium to uranium in the minerals is constant, namely, about one to three million. Owing to the minute proportion present, the separation is a lengthy and expensive process. If the mineral contains no barium, a small quantity of a soluble barium salt is added to it, and the barium is then separated by the usual chemical methods. The whole of the radium associates itself with the barium, which it closely resembles. The radium is then separated from the barium by repeated fractional crystallisations of the chlorides or bromides, the radium halogen salts being less soluble in water and dilute mineral acids than the corresponding barium salts. Metallic radium has been prepared by electrolysing radium chloride with a mercury cathode and distilling the amalgam so formed in hydrogen under reduced pressure; after the last of the mercury had volatilised, radium remained as a pure white metal, melting at about 200°. Its chief compounds are the hydroxide, $Ra(OH)_2$, the halides, $RaCl_2$, $RaCl_2,2H_2O$, $RaBr_2$, $RaBr_2,2H_2O$, the nitrate, $Ra(NO_3)_2$, the sulphate, $RaSO_4$, and the carbonate, $RaCO_3$. Both in chemical properties and appearance, all these compounds closely resemble the analogous barium salts, the most stable being the sulphate.

The radioactive elements possess, in addition to the normal physical and chemical properties corresponding to their position in the periodic group, the property of radioactivity, that is, of emitting radiations, the atom spontaneously disintegrating until a stable atom (an atom which is not radioactive) is formed, the final result of disintegration being certain of the isotopes of lead. The process of disintegration cannot be controlled or altered by any methods that

have yet been tried. The radiations emitted are of three main types. The α-particle, which is a positively charged atom of helium, is the least penetrating of the three, and is absorbed by thin screens of paper or mica, or by about 3 inches of air. It is expelled with a velocity equal to about one-twentieth that of light. The β-particle is an electron or unit of negative electricity with an apparent mass of about $\frac{1}{1847}$ of the hydrogen atom. Its velocity of expulsion varies from one-third to almost equal to that of light, and it can penetrate a sheet of lead of about 3 millimetres thickness. The γ-ray carries no charge and, like X-rays, is a wave motion propagated with the velocity of light and is much more penetrating than either the α- or β-particles. These emanations ionise the air and discharge an electroscope, affect a photographic plate and cause fluorescence in substances such as barium platinocyanide, zinc sulphide, calcium sulphide, fluorspar, willemite, diamond and ruby. They promote certain chemical reactions, such as converting oxygen into ozone, and discolour paper and glass. They also affect the skin and produce painful, slowly healing sores.

Anhydrous radium bromide, $RaBr_2$, is the salt usually found in commerce, and is sold on the basis of its radium content. A tube of radium or metallic uranium of known weight and activity is used as a standard. The international standard consists of 21·99 milligrams of pure radium chloride in a sealed glass tube kept at Paris; a duplicate is kept at Vienna, and the British standard of about 20 milligrams of pure radium chloride is kept at the National Physical Laboratory. The curie is an international standard for the amount of radium emanation in equilibrium with 1 gramme of radium. The usual strength of radium emanation water for internal use is 1 millicurie per litre. The Mache standard for radioactive water can be converted into the curie by taking 1 millicurie as equal to 2·7 million Mache units.

Action and Uses.—All the rays emitted by radium can produce effects on living tissue. These effects are similar in nature whichever type of radiation (alpha, beta or gamma) is used, and all degrees of cell damage may be produced up to the complete death of the cell. Although it is true that there is no tissue in the body that cannot be destroyed by exposure to any of the radiations of radium in sufficient dosage, the sensitivity of the different tissues and organs varies greatly. Among the more sensitive of these are the essential glandular cells of the testes and ovaries, the leucocytes, especially the lymphocytes and lymphatic tissues generally, the hæmopoietic tissues, the skin and mucous membrane, the secreting cells of the salivary glands, the conjunctiva and cartilage. Among the tissues more resistant to the radiations of radium are muscle, nerve tissue, the liver and the kidneys. On the skin an inflammatory reaction is caused which, when it stops short of vesication, is termed "erythema." The erythema is accompanied by epilation of hairy parts and depression in the activity of sweat and sebaceous glands. It subsides in a few days, and an almost normal skin remains, perhaps somewhat abnormally dry. Larger doses cause vesication, and still larger doses necrosis of all the layers. Ulcers so produced are extremely

difficult to heal and are often very painful. The effects described are those produced by large doses applied in a short period of time, such as are used in radium therapy. Repeated small doses, such as are sustained by those who have to handle radium in the course of their work, produce somewhat different effects, namely, dryness, hyperkeratosis and warts, fissures, and in some cases, eventually, epithelioma. In both types of exposure, but more commonly in the chronic type, telangiectases may follow. The effects upon mucous membranes are principally inflammatory. Cystitis, proctitis, vaginitis and other inflammations of the mucous membrane are commonly seen after therapeutic irradiation by radium, and perforation of hollow organs may follow. The action upon the sexual organs results in the destruction of the spermatogenic and oögenic cells, with consequent sterility. So far as is known, the internal secretory cells are not affected, and, in the male, sterility is not accompanied by impotence. Appreciable changes in the blood cells are only observed after large doses or repeated exposure to small doses as in the case of persons who habitually have to handle radium. The first effects are upon the leucocytes, the total number of which is reduced. While all forms of leucocytes suffer some reduction in their number, it is found that the lymphocytes suffer most, and these cells may form only 5 to 10 per cent. of the total count. The red cells and hæmoglobin may be moderately reduced, the colour index tending to fall. However, in chronic exposure to radium radiations there is probably a stage in which both red cells and hæmoglobin are increased slightly above normal, and the colour index may be above unity. Aplastic anæmia is said to be an end-result of repeated exposure to small doses of radium radiations.

Action on pathological tissues.—In general it may be said that the more active the reproductive activity of the cells of a tissue, the more sensitive to radiations will that tissue be. Thus, actively growing malignant tumours are more easily damaged than slowly growing ones, and innocent tumours are scarcely radio-sensitive at all. In all cases, the radio-sensitivity of pathological tissues has to be considered in relation to that of the normal tissues, since the dosage that can be applied in radium therapy must obviously be limited by the tolerance of the normal tissues. In most cases of malignant growths the margin is small, but in a few types of growths, e.g. lymphosarcoma and seminoma, the tumours are very radio-sensitive in relation to the normal tissues and can often be destroyed without causing appreciable damage to the latter. In most cases of carcinoma, however, the best results are obtained only when such doses are given as will cause inflammatory reaction in the healthy tissues, but it is important that dosage should be so regulated as not to cause irreparable damage. Among the carcinomata, the most sensitive are the squamous-celled variety, especially when occurring in the cervix, skin and throat. Columnar-celled carcinoma is the most resistant variety, especially that found in the rectum. Sarcomata are, on the whole, more sensitive than carcinomata, but the slowly growing varieties of fibro-sarcoma are often found to be quite

insensitive. Other conditions for which radium radiations are sometimes used are uterine fibroids, tuberculous glands and other tuberculous conditions, and nævi. In the treatment of fibroids, the radiations act by destroying the oögenic cells of the ovaries, with consequent arrest of hæmorrhage and secondary atrophy of the fibroids. It is possible that some direct effect upon the fibroids may also be produced. In tuberculous conditions, the effect is probably due to the production of a mild inflammation in the neighbourhood of the lesion, which promotes the resolution of the tuberculous process. In the case of nævi, the radiations act by causing obliteration of the blood vessels. The changes are seen principally in the endothelial lining of the vessel walls, but also as an increase of fibrous tissue in the vessel walls themselves.

Mode of Application.—Although radium has occasionally been administered in solution by the mouth and by injection, these methods have little therapeutic value and, except when the most minute dosage is employed, may be dangerous. Radium so administered has been detected after death in the tissues, especially the bone, by the characteristic radiations which continue to be emitted within the body. The usual mode of application of the radiations is directly to the lesion which it is desired to treat. Because of their extremely low penetrating power, the alpha rays are of little or no value for therapeutic purposes, and are completely absorbed in the wall of the radium container before they can reach the tissues of the patient. The thinnest beta rays have a limited penetrating power, so that their effects are manifest only in the immediate neighbourhood of the source of radiation. Their therapeutic value is therefore limited. They are occasionally used for the treatment of very superficial skin lesions, such as rodent ulcers, the radium being enclosed in a thin-walled plaque. The highly-penetrating gamma rays are, of course, also present, but their intensity is very small compared with that of the beta rays. The gamma rays have a very high penetrating power, and can be obtained almost free from alpha and beta rays by filtration through 0·6 millimetre of platinum, or an equivalent quantity of another metal. These rays are applied by three main methods, namely, transcutaneously, intracavitally (in hollow organs) and interstitially. For transcutaneous or surface application, the radium is applied directly to the skin, with the intervention only of a layer of lint or rubber, for the treatment of superficial lesions, such as small rodent ulcers and nævi. For the treatment of deeper lesions, the radium is held at a suitable distance from the skin. The greater the distance the less will the rays diverge upon entering the tissues, and therefore the more deeply will they penetrate. For lesions which cover a wide area and do not extend too deeply, the radium may be applied upon a layer of columbia wax, which can be moulded to the surface. To lighten the weight of the apparatus, sheets of porous rubber are sometimes used in place of columbia wax. Several radium foci, usually from 2 to 5 milligrams or more, are uniformly distributed on the outer surface of the columbia

paste mould, and the whole apparatus is worn for several hours a day for several days. When malignant growths are being treated in this way, for example, malignant glands or small or recurrent carcinomata of the breast, treatment is persevered with until a definite erythema is observed. For the deepest lesions, large masses of radium may be applied at a distance of several centimetres from the surface—the so-called "bomb therapy". For intracavital irradiation, the radium, usually 50 or 100 milligrams, enclosed in a tube of platinum of not less than 0·6 millimetre thickness, is wrapped in rubber or gauze, introduced into the appropriate cavity, and left for a period varying from several hours to several days. For interstitial therapy, the radium is enclosed in sharp pointed, hollow needles. The radium content of these needles varies, but an average content is 0·5 milligram of radium to each centimetre of the needle. The needles are inserted into the affected region, either through the skin or at open operation, in such a way that a uniform network of needles is secured throughout and around the lesion. 10, 20, or even 30 needles may be employed in this way, with a total quantity of up to 100 or more milligrams of radium when an extensive lesion is treated.

Dose.– For internal use, daily doses of 0·005 milligram of radium bromide in solution have been given. Owing to the cumulative effect, it is doubtful if administration by this method is ever justifiable. For surface application, the dosage depends upon a great many technical factors, such as the distribution of radium in the applicator, the wall-thickness of the applicator and the distance of the applicator from the surface. The dosage is largely a matter for experimental determination with each applicator. The erythema dose is a valuable guide in this connection and, generally speaking, full erythema doses are required in the treatment of malignant conditions. A common method of expressing dosage is in "milligram-hours," that is, the product of the number of milligrams of radium used and the number of hours for which it is applied. This statement of dosage is of little value unless it is accompanied by all the other details of the application. The same applies to the intracavital and interstitial methods. As a rough guide, with a total quantity of 50 milligrams of radium, filtered by 0·6 millimetre of platinum and evenly distributed in needles throughout the cervix uteri and parametria, an average total dose would be from 5000 to 6000 milligram-hours.

RADON, or radium emanation, is used occasionally in the treatment of malignant disease. Its therapeutic indications and the radiations emitted are identical with those of radium salts, but in calculating dosage, allowance has to be made for the fact that the intensity of radiation is not constant, but is continuously decreasing, falling to half its value in 3·85 days. The emanation is filled into small gold or platinum containers; these are implanted in the tumour and allowed to remain in position for a calculated period of time. The containers, or "seeds", have a thread attached, and frequently this is fixed in position with the aid of a solution of mastic in benzene.

RESORCINOL

(Resorcin.)

Resorcinol

$C_6H_6O_2 = 110{\cdot}0$

Synonyms—Resorcinum; Resorcin.

Resorcinol is *m*-dihydroxybenzene, $C_6H_4(OH)_2$, and may be obtained by fusing sodium hydroxide with sodium *m*-benzenedisulphonate, cooling, dissolving in boiling water, adding hydrochloric acid and boiling until all sulphur dioxide is evolved. The solution is cooled and filtered, the filtrate extracted with ether, and the latter evaporated. The product thus obtained is purified by sublimation and recrystallised from water or benzene. Resorcinol occurs in white or nearly white, acicular crystals or as a crystalline powder. It has a slight but characteristic odour, and a taste which is unpleasant, sweetish and pungent at first and afterwards bitter.

On exposure to light and air, resorcinol becomes pinkish. In the presence of alkali the aqueous solution rapidly darkens and acquires a strong green fluorescence. It sublimes when heated above the melting-point. When a solution of resorcinol in sodium hydroxide solution is warmed with a trace of chloroform, an intense crimson colouration is produced, which changes to pale yellow when the mixture is rendered slightly acid with hydrochloric acid. On the addition of bromine water to the aqueous solution, a white precipitate of tribromoresorcinol is produced. When resorcinol is heated for a few minutes with an equal weight of phthalic anhydride, and the product dissolved in dilute sulphuric acid and poured into dilute ammonium hydroxide solution, a yellowish-green fluorescence is produced owing to the formation of fluorescein. It should be **stored** in well-closed containers and protected from light.

Soluble in water (4 in 3), alcohol (90 per cent.) (1 in 1), ether (1 in 1), glycerin (1 in 1) and olive oil (1 in 22); very slightly soluble in chloroform, carbon disulphide and benzene.

Standard, B.P.—Resorcinol has a melting point of 110° to 111°. Ash, not more than 0·05 per cent. The 5 per cent. w/v aqueous solution is neutral or only slightly acid to litmus and, when warmed, does not emit the odour of phenol. It complies also with a test for absence of catechol.

Action and Uses.—Resorcinol was formerly given internally as an antipyretic, but its use for this purpose has been abandoned on account of the readiness with which it forms methæmoglobin, and the consequent danger of collapse. It is more powerfully antiseptic than phenol, but is, perhaps, less poisonous and irritating. It is excreted in the urine in combination with sulphuric and glycuronic acids. Resorcinol is sometimes employed as a gargle (3 per cent.), and as an eye-lotion in conjunctivitis (1 per cent.). Solutions and ointments (2 to 10 per cent.) are used as antiseptic applications and for the local treatment

of laryngeal tuberculosis. It is a useful anti-pruritic, and ointments containing resorcinol with zinc oxide, salicylic acid, etc., are used in psoriasis, eczema, and other irritable skin affections. Resorcinol solutions, such as Spiritus Resorcinolis, are used as antiseptic applications to remove dandruff, but may slightly discolour fair hair unless all traces of soap or alkali are removed from the hair beforehand. Resorcinol is **incompatible** with alkalis and with Spiritus Aetheris Nitrosi.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

HYDROQUINONUM.—Hydroquinone, or quinol, is 1:4-dihydroxybenzene, $C_6H_4(OH)_2$, and may be prepared from phenol by oxidation with alkaline potassium persulphate or by the oxidation of aniline. It has a melting-point of about 170°, and a boiling-point of about 285° (730 mm. pressure). It is readily soluble in hot water, ether and alcohol. It is used as a photographic developer, often in conjunction with metol.

METOL.—Metol is methyl-*p*-aminophenol sulphate, $[C_6H_4(OH)(NH{\cdot}CH_3)]$, H_2SO_4, and may be obtained by heating hydroquinone with aqueous methylamine under pressure and pouring the product into sulphuric acid. It has a melting-point of about 250° to 260° and is soluble in cold water (1 in 20) and boiling water (1 in 6). It is used in conjunction with hydroquinone as a photographic developer.

RESORCINOLIS MONOACETAS.—Resorcinol monoacetate may be prepared by the interaction of resorcinol and acetyl chloride. It occurs as a reddish-yellow, viscous liquid, soluble in acetone and in moderately dilute alcohol; it is used in solution in these solvents as a lotion in the treatment of dandruff, acne and seborrhœa.

Preparations

Pasta Resorcinolis, B.P.C.—(Past. Resorcin.)—Resorcinol Paste. *Syn.*—Pasta Resorcini; Resorcin Paste; Lassar's Stronger Resorcin Paste. Resorcinol, zinc oxide and starch, of each about 20 per cent., with liquid paraffin.

Pasta Resorcinolis Mitis, B.P.C.—(Past. Resorcin. Mit.)—Mild Resorcinol Paste. *Syn.*—Pasta Resorcini Mitis; Mild Resorcin Paste; Lassar's Mild Resorcin Paste. Resorcinol, about 10 per cent., zinc oxide and starch, of each about 25 per cent., with liquid paraffin.

Spiritus Resorcinolis, B.P.C.—(Sp. Resorcin.)—Spirit of Resorcinol. *Syn.*—Spiritus Resorcini; Spirit of Resorcin; Spiritus Capillaris; Lotio Resorcinolis Composita. Resorcinol and castor oil, of each 1 in 40, in Cologne spirit and alcohol (90 per cent.).

Unguentum Resorcinolis, B.P.C.—(Ung. Resorcin.)—Resorcinol Ointment. *Syn.*—Unguentum Resorcini; Resorcin Ointment. Resorcinol, 12·5 per cent., in glycerin, wool fat and white soft paraffin.

Unguentum Resorcinolis Compositum, B.P.C.—(Ung. Resorcin. Co.)—Compound Resorcinol Ointment. *Syn.*—Unguentum Resorcini Compositum; Compound Resorcin Ointment. Resorcinol, 4 per cent., and bismuth subnitrate, 8 per cent., with distilled water, starch, zinc oxide, birch tar oil, and potassium pyrosulphite, in wool fat, ceresin and yellow soft paraffin.

Unguentum Resorcinolis et Bismuthi Compositum, B.P.C.—(Ung. Resorcin. et Bism. Co.)—Compound Resorcinol and Bismuth Ointment. *Syn.*—Unguentum Resorcini et Bismuthi Compositum; Compound Resorcin and Bismuth Ointment. Resorcinol and bismuth subchloride, of each 8 per cent., with distilled water, zinc oxide, starch, birch tar oil, oil of cade and wool fat.

Unguentum Rusci Compositum, B.P.C.—(Ung. Rusc. Co.)—Compound Birch Tar Ointment. Birch tar oil, 8 per cent., with resorcinol, zinc oxide and starch, in hydrous wool fat and white soft paraffin.

Unguentum Sulphuris et Resorcinolis, B.P.C.—(Ung. Sulphur. et Resorcin.)—Sulphur and Resorcinol Ointment. *Syn.*—Unguentum Sulphuris et Resorcini; Sulphur and Resorcin Ointment. Sublimed sulphur, 4 5 per cent., and resorcinol, 3 per cent., in yellow soft paraffin.

RHAMNUS
(Rham.)
Buckthorn

Buckthorn is the fresh, ripe fruit of *Rhamnus catharticus* Linn. (Fam. Rhamnaceæ), a shrub indigenous to Great Britain.

The fruit is black, globular to ovoid, about 8 millimetres in diameter, with four loculi, each containing one seed; at the base are the remains of the calyx with a short pedicel attached, and at the apex is the scar of the stigma. The taste is at first sweetish, but afterwards bitter and acrid. Buckthorn **contains** dextrose, emodin, emodinanthranol, rhamnoxanthol, jesterin, rhamnocathartin and succinic acid, and the colouring matters, kæmpferolmethylether, rhamnetin, xanthorhamnin and quercetin.

Action and Uses.—The juice of buckthorn is employed in the preparation of Syrupus Rhamni which is used chiefly as a laxative in veterinary practice.

Preparation

Syrupus Rhamni, B.P.C.—(Syr. Rham.)—Syrup of Buckthorn. A solution of sucrose in the juice expressed from buckthorn fruit, containing also oil of pimento, alcohol (90% per cent.) and strong tincture of ginger. Dose.—2 to 4 millilitres (½ to 1 fluid drachm).

RHEUM
(Rheum)
Rhubarb

Synonyms—Rhei Rhizoma; Turkey Rhubarb.

Rhubarb consists of the rhizome of *Rheum palmatum* Linn. and possibly of other species of *Rheum* (Fam. Polygonaceæ) cultivated in China and Tibet, deprived of most of its bark, and dried. The rhizomes are dug up, the large, thick roots are cut off, the crown is removed and also more or less of the bark, after which the larger ones are cut transversely or halved longitudinally to facilitate drying, for which purpose the pieces are often strung on cords stretched from tree to tree, or placed on hurdles in a heated hut, or on heated stones.

Rhubarb occurs in heavy, compact pieces of various shapes, which are often perforated. Those from small, uncut rhizomes are cylindrical, conical, or barrel-shaped, and frequently from about 7 to 10 centimetres in length and 3 to 6 centimetres in thickness; they are known commercially as "rounds." Pieces from larger rhizomes,

split longitudinally, are plano-convex, and may be 8 to 15 centimetres in length and 4 to 10 centimetres wide; they are known as "flats." The pieces are sometimes covered with a bright yellow powder and, when this is removed, the surface shows numerous longitudinal, dark reddish-brown lines or spots embedded in a whitish matrix. The fracture is granular and uneven. The smoothed, transversely cut surface is pinkish-brown or greyish in colour and shows, near the periphery, a dark cambium line, which is sometimes removed with the whole of the phloem and external tissues during the peeling. Externally to the cambium may often be found the narrow remains of the secondary phloem, consisting of dark, reddish-brown medullary rays containing colouring matter, alternating with white lines of phloem parenchyma containing starch and calcium oxalate. Within the cambium is a narrow, radiate, normal secondary xylem, on the inner border of which occurs a ring of more or less united, star-like, vascular strands, consisting of dark red medullary rays radiating through a central, white phloem and peripheral xylem. Rhubarb gives a reddish-brown fluorescence when viewed in ultra-violet light. The drug has a characteristic, somewhat aromatic odour, and a bitter, slightly astringent taste.

The diagnostic **microscopical** characters are, in the parenchyma, the abundant starch grains, up to about 20 microns in diameter, either simple or compound, with up to about 5 components and showing a hilum usually in the form of a radiate split; the large cluster-crystals of calcium oxalate, about 20 to 200 microns in diameter and frequently more than 100 microns; an amorphous, yellow substance, insoluble in alcohol (90 per cent.) but soluble in water, and becoming reddish-pink on treatment with dilute solution of ammonia and deep red with solutions of caustic alkalis; the walls of the vessels and other elements of the xylem, which give no reactions for lignin; the absence of cork and of sclerenchymatous fibres and cells.

Rhubarb **contains** as its chief constituents certain anthraquinone derivatives. Among the substances which have been isolated from sun-dried Shensi rhubarb are cinnamic and gallic acids, tannin, rheinolic acid ($C_{17}H_{10}O_6$, melting-point, 295° to 297°), rhein, emodin, aloe-emodin, emodinmonomethylether, chrysophanic acid, and glycosides of the last five compounds. The chief purgative constituent of the drug is an amorphous, non-glycosidal resin which, on hydrolysis, yields cinnamic and gallic acids, rhein, emodin, aloe-emodin, emodin monomethylether, chrysophanic acid, and a compound, $C_{14}H_{12}O_3$, (melting-point, 256°), which is probably trihydroxydihydroanthracene. The drug also contains volatile oil, dextrose, lævulose, the phytosterol, verosterol, starch, calcium oxalate, and the following acids: palmitic, hexoic, stearic, oleic, linolic and linolenic.

Varieties.—The two important commercial varieties of Chinese rhubarb are known respectively as Shensi and Canton. Each may occur in "rounds" from the small rhizomes or "flats" from the larger, longitudinally split rhizomes. Shensi rhubarb has a bright yellow surface, is very compact, and shows distinct whitish reticulations which give rise to the characteristic "nutmeg" fracture; the best varieties have a bright pink tint on the freshly fractured surface.

Canton rhubarb has a more or less uniformly granular fracture and shows no distinct marbling; it is more fibrous and not so bright, the whitish reticulations being less distinct and the odour and taste less agreeable. Such commercial designations as "East Indian" or "Turkey" rhubarb refer to the route by which the drug formerly reached the European markets. Practically all Chinese rhubarb is now exported from Shanghai.

Substitutes.—"High-dried" rhubarb may resemble either the Shensi or Canton drug in the appearance of the fractured surface but the outer surface is duller and rougher, and the odour and taste are distinctly empyreumatic; the "rounds" are shrunken and frequently show the remains of the bud, and the surface bears dark patches; the "flats" are very hard and show signs of having been extensively trimmed. English rhubarb is obtained from *Rh. officinale* Baill. and *Rh. Rhaponticum* Linn. The rhizomes of *Rh. officinale* resemble the official drug but are softer and wrinkle strongly during the drying; the white reticulations are usually absent, and the star-spots are less numerous. The roots are also available and may be distinguished by the cylindrical shape and the radiate transverse section. The rhizome of *Rh. Rhaponticum* is also shrunken and usually pinkish in colour. It may be distinguished by the transverse section which shows a diffuse ring of isolated star-spots. It contains certain anthraquinone derivatives, and may be identified by the following test for the glycoside, rhaponticin, which it contains: 10 grammes of the powdered drug is percolated with alcohol (60 per cent.) and 25 millilitres of the percolate is evaporated at 80° to 7 grammes; the residue is shaken vigorously while warmed with 10 millilitres of ether, and the ethereal layer is set aside in a stoppered bottle; needle-shaped brownish crystals of rhaponticin separate within twenty-four hours. Rhapontic rhubarb is also imported from China and is known commercially as "Chinese rhapontic." It resembles the English drug but is usually darker, often hollow in the centre, and the radiate transverse section shows alternate paler and darker concentric rings. Rhapontic rhubarb gives a bright violet or lilac fluorescence when viewed in ultra-violet light.

Standard, B.P.—Rhubarb contains not more than 2 per cent. of foreign organic matter. Ash, not more than 15 per cent. Alcohol (45 per cent.)—soluble extractive not, less than 35 per cent.

Rhubarb, in powder (Pulvis Rhei: Pulv. Rhei), contains the constituents and possesses the diagnostic microscopical characters of Rheum, and complies with the limits for ash and alcohol-soluble extractive of the unground drug.

Action and Uses.—Rhubarb is employed as a stomachic in atonic dyspepsia and as a laxative. In large doses it is purgative by virtue of irritation of the large intestine. Purgation is followed by an astringent effect, owing to the tannin present. Preparations of rhubarb are suitable as occasional aperients, but should not be used in chronic constipation. A variable amount is absorbed, and imparts a yellowish-brown colour to the urine, which is changed to a purplish-red on the addition of alkali; symptoms of renal irritation are not, however, common. It is employed in diarrhœa due to irritating substances in the intestines, the after-astringent effect checking the diarrhœa. Rhubarb is **administered** as infusion or tincture, and in powder in cachets, powders, tablets, or mixtures, often with sodium bicarbonate and oil of peppermint. Small doses of the compound tincture or infusion may replace the powdered drug. Pulvis Rhei Compositus and Syrupus Rhei are employed as laxatives for delicate persons and children.

Dose.– 0·2 to 1 gramme (3 to 15 grains).

Preparations

Extractum Rhei, B.P.C.—(Ext. Rhei)—Extract of Rhubarb. A dry extract. Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

This extract was included in the British Pharmacopœia, 1914.

Extractum Rhei Liquidum, B.P.C.—(Ext. Rhei Liq.)—Liquid Extract of Rhubarb. 1 in 1. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Infusum Rhei Concentratum, B.P.C.—(Inf. Rhei Conc.)—Concentrated Infusion of Rhubarb. 1 in 2½. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of rhubarb, and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Infusum Rhei Recens, B.P.C.—(Inf. Rhei Rec.)—Fresh Infusion of Rhubarb. 1 in 20. When infusion of rhubarb or Infusum Rhei is prescribed, fresh infusion not being specified, either Infusum Rhei Recens or Infusum Rhei Concentratum suitably diluted, may be dispensed. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This infusion was included in the British Pharmacopœia, 1914, *under the name of Infusum Rhei.*

Liquor Rhei Dulcis, B.P.C.—(Liq. Rhei Dulc.)—Sweet Solution of Rhubarb. *Syn.*—Elixir Rhei; Elixir of Rhubarb; Sweet Essence of Rhubarb. Liquid extract of rhubarb, 1 in 4, with oil of anise, syrup, glycerin, alcohol (90 per cent.) and distilled water. Dose.– 4 to 12 millilitres (1 to 3 fluid drachms).

Mistura Rhei et Cascaræ, B.P.C.—(Mist. Rhei et Casc.)—Rhubarb and Cascara Mixture. Each fluid ounce contains 4 grains of rhubarb, 12 grains of sodium bicarbonate and 20 minims of liquid extract of cascara sagrada, with liquid extract of liquorice, syrup of ginger, oil of peppermint and chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Mistura Rhei et Sodii Bicarbonatis, B.P.C.—(Mist. Rhei et Sod. Bicarb.)—Rhubarb and Sodium Bicarbonate Mixture. *Syn.*—Mistura Rhei Composita; Mistura Rhei et Soda. Each fluid ounce contains 4 grains of rhubarb and 12 grains of sodium bicarbonate, with oil of peppermint, syrup of ginger and chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Pilulæ Hydrargyri cum Rheo, B.P.C.—(Pil. Hydrarg. c. Rheo)—Mercury Pills with Rhubarb. Each pill contains 2½ grains of pill of mercury and 2½ grains of compound pill of rhubarb. Dose.– 1 pill.

Pilula Rhei Composita, B.P.—(Pil. Rhei Co.)—Compound Pill of Rhubarb. *Syn.*—Compound Rhubarb Pill. Rhubarb, about 25 per cent., and aloes, about 20 per cent., with myrrh, hard soap, oil of peppermint and syrup of liquid glucose. Dose.– 0·25 to 0·5 gramme (4 to 8 grains).

Pulvis Rhei Compositus, B.P.—(Pulv. Rhei Co.)—Compound Powder of Rhubarb. *Syn.*—Gregory's Powder. Rhubarb, 25 per cent., with heavy magnesium carbonate, light magnesium carbonate and ginger. Dose.– 0·6 to 4 grammes (10 to 60 grains).

Syrupus Rhei, B.P.C.—(Syr. Rhei)—Syrup of Rhubarb. Liquid extract of rhubarb, about 1 in 14, and oil of coriander, 1 in 2000, in syrup. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

This syrup, prepared directly from rhubarb by percolating 70 *grammes in No.* 20 *powder with* 270 *millilitres of alcohol* (90 *per cent.*) *diluted with* 810 *millilitres of distilled water, dissolving* 840 *grammes of sucrose in the percolate previously evaporated to* 475 *grammes, adding* 0·5 *millilitre of oil of coriander dissolved in* 10 *millilitres of alcohol* (90 *per cent.*) *and adjusting the volume to* 1000 *millilitres with distilled water, was included in the British Pharmacopœia,* 1914.

Tinctura Rhei Composita, B.P.—(Tinct. Rhei Co.)—Compound Tincture of Rhubarb. Rhubarb, 1 in 10, with cardamom, coriander and glycerin, prepared by percolation with alcohol (60 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tabellæ Rhei et Sodii Bicarbonatis, B.P.C.—(Tab. Rhei et Sod. Bicarb.)—Tablets of Rhubarb and Sodium Bicarbonate. *Syn.*—Rhubarb and Soda Tablets. Each tablet contains 3 grains of rhubarb, 1½ grains of sodium bicarbonate and ½ grain of ginger. Dose.– 1 or 2 tablets.

RHŒADOS PETALUM

(Rhœad. Pet.)

Red-Poppy Petal

Synonyms—Rhœados Petala; Red-Poppy Petals.

Red-poppy petal consists of the fresh or dried petals obtained from *Papaver Rhœas* Linn. (Fam. Papaveraceæ), a herb common in England and Europe.

The fresh petals are of a bright scarlet colour with a dark violet claw, broadly ovate in shape and about 6 centimetres in breadth, with an entire margin, within which the vein-endings anastomose to form a continuous row of small arches, leaving a band-like space, about 0·15 to 0·25 millimetre broad and quite destitute of veins. The odour is heavy and characteristic. When dried, the drug changes colour and loses about 90 per cent. of its weight. The dried petals are dull reddish-violet in colour and without odour, the taste being mucilaginous and slightly bitter. The application of acid restores the scarlet colour; alkalis turn it a greenish-blue. The ash is about 16 per cent.

The petals **contain** two anthocyanidin diglycosides, of which mecocyanin predominates. It contains also the crystalline, non-poisonous alkaloid, rhœadine; the presence of morphine has been alleged, but this has not been confirmed.

Substitutes.—*Papaver dubium* Linn. has petals about half the size of red-poppy petals, those of *P. Argemone* Linn. are still smaller; both plants can also be distinguished by the narrow and more oblong ovary and fruits.

Uses.—Red-poppy petal in the form of Syrupus Rhœados is used as a colouring agent for mixtures and gargles.

Preparation

Syrupus Rhœados, B.P.C.—(Syr. Rhœad.)—Syrup of Red-Poppy. A solution of sucrose in an aqueous infusion of dried red-poppy petal. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This syrup, prepared with five times the weight of fresh petal, was included in the British Pharmacopœia, 1914.

RHUS
(Rhus)
Rhus

Synonyms—Rhus Glabra; Rhus Fructus; Sumach; Sumac Berries.

Rhus consists of the dried fruits of the smooth or Pennsylvanian sumach, *Rhus glabra* Linn. (Fam. Anacardiaceæ), a shrub 1 to 4 metres high, indigenous to Canada and the United States of America. The fruits develop on a large thyrse, from which they are easily detached.

The fruits are ovoid or reniform, slightly flattened, about 4 millimetres in diameter, but less in thickness. They are deep crimson externally, and covered with short, velvety hairs. The base usually has attached to it the remains of a five-pointed calyx and a short pedicel; the apex shows the faint scar from, or the remains of, the tripartite black style. The fruit contains a single greyish-yellow seed, about 2 millimetres in diameter. The drug is odourless, but has an acid, astringent taste.

Rhus **contains** malic acid, calcium acid malate, tannic and gallic acids, fixed oil and red colouring matter.

Standard.—Rhus contains not more than 5 per cent. of its stems and other foreign organic matter.

Action and Uses.—Rhus has astringent properties. It is reputed to have a diuretic action, but is seldom employed internally. It is used in the form of decoction (1 in 20) or liquid extract (1 in 1), mixed with glycerin and water, as a gargle, especially in conjunction with potassium chlorate.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

RICINI SEMEN
(Ricin. Sem.)
Castor Oil Seed

Castor oil seed consists of the seeds obtained from *Ricinus communis* Linn. (Fam. Euphorbiaceæ), a native of India. The plant is cultivated in tropical and sub-tropical countries, and may be a tree, a shrub, or an annual herb, according to the climate.

The seeds are rounded, oblong and somewhat flattened, from 8 to 12 millimetres or more in length, with an arched, dorsal surface, and a nearly flat, ventral surface; the width is about two-thirds of the length, and the thickness about one-third. The seed coat, which is thin and brittle, is smooth and glossy, varying in colour from greyish-brown to grey, and mottled with reddish-brown or black spots and stripes. At one extremity of the seed there is a prominent and usually pale

coloured caruncle, from which the raphe runs along the ventral surface as a distinct line to the other extremity, where it terminates in a raised chalaza. The caruncle can be removed easily, disclosing the hilum beneath as a dark spot. A delicate, silvery-white membrane inside the seed coat surrounds a large, yellowish-white, oily endosperm, which encloses the embryo with two large, papery cotyledons. The seeds have scarcely any odour and only a very slight, acrid taste.

The diagnostic **microscopical** characters are the polygonal, pitted epidermal cells, some with, and others without, brown contents; the palisade layer of the seed coat, consisting of brown, pitted, sclerenchymatous cells; the large aleurone grains of the endosperm; the abundant fixed oil. The aleurone grains are round or ovoid, and measure up to about 20 microns in diameter.

Castor oil seed **contains** about 50 per cent. of fixed oil. The cake left after expression of the oil contains a crystalline principle, ricinine, the poisonous phytalbumose, ricin, and a very active lipase and other enzymes.

Action and Uses.—Castor oil seed is poisonous, and two or three seeds have been known to prove fatal. Even so small a dose of ricin as $\frac{1}{2500000}$ of the body weight may cause toxic symptoms when injected. The action of ricin is, however, much less powerful in the stomach than when injected hypodermically; in the latter case small doses soon produce immunity, anti-ricin being formed. The observation of this protective reaction laid the foundation of serum therapy. Lipase has been utilised commercially for splitting fats and oils.

ROSÆ FRUCTUS

(Ros. Fruct.)

Rose Fruit

Synonyms—Rosæ Caninæ Fructus; Dog Rose Fruits; Hips.

Rose fruit consists of the fresh, ripe fruits of *Rosa canina* Linn. (Fam. Rosaceæ) and other closely allied, indigenous species of *Rosa*.

The fruit is about 15 to 20 millimetres long and 10 to 12 millimetres wide, ovoid, smooth, shining and scarlet-red. It consists of the fleshy, concave, urn-shaped receptacle, bearing on its inner surface about 20 to 25 small, hairy achenes, each about 5 millimetres long and 2 millimetres broad. At its summit, the receptacle bears the scars left by the fall of the five sepals, and through the central opening the styles and stigmas protrude as a short, dense tuft of separate threads, each of which is attached to an achene. The taste is acid and agreeable.

Rose fruit **contains** malic and citric acids, sugar (about 30 per cent.), and a trace of tannin.

Substitute.—The fruit of the field rose, *R. arvensis* Huds., resembles that of *R. canina*, but is nearly globular and the styles of the achenes protrude in the form of a column.

Use.—Rose fruit is used in the preparation of confection, which is occasionally employed as a pill excipient.

Preparation

Confectio Rosæ Caninæ, B.P.C.—(Conf. Ros. Can.)—Confection of Rose Fruit. *Syn.*—Confection of Hips. Rose fruit deprived of its achenes, beaten to a pulp and mixed with sucrose.

ROSÆ PETALUM

(Ros. Pet.)

Red-Rose Petal

Synonyms—Rosæ Gallicæ Petala; Red Rose Petals.

Red-rose petal consists of the petals obtained from the red or Provence rose, *Rosa gallica* Linn. (Fam. Rosaceæ), which is extensively cultivated throughout the world. The unexpanded petals are plucked as a whole from the receptacle, and the lighter coloured, basal portions cut off. They are used both fresh and dried, in the latter case being gently sifted to remove any stamens.

The petals generally occur in compact, conical masses, about 10 to 20 millimetres high and 9 to 13 millimetres wide. The individual petals, which are obovate to obcordate in shape, have a velvety upper surface of a deep purplish-red colour, paler towards the base. The odour is delicate and rose-like, and the taste is slightly astringent. The petals give a yellowish-red colour with acids, a green to brown colour with alkalis, and a deep blue with salts of iron.

The diagnostic **microscopical** characters are the straight-walled, papillose cells of the upper epidermis; the wavy-walled cells of the lower epidermis, with characteristic projections into their lumina; the slender, spiral vessels from the veins; the occasional cluster-crystals of calcium oxalate; the spherical pollen grains; the linear, unicellular hairs.

The drug **contains** the glycoside, cyanin (2 per cent.), which has been obtained as a dark brown, microcrystalline substance. It also contains a yellow, crystalline body, similar to, but not identical with, quercitin, together with gallic acid and possibly quercitannic acid.

Substitute.—Exhausted petals which have been recoloured have no pale region at the base.

Action and Uses.—Red-rose petal is mildly astringent; for this property, and for its colouring matter, it is used as Infusum Rosæ Acidum and as Syrupus Rosæ. Acid infusion of roses is a convenient vehicle for gargles containing alum or tannin; it should not be prescribed with borax or other alkaline salts. It is used also as a vehicle for quinine in mixture form. Red-rose petal is also employed in the preparation of Confectio Rosæ Gallicæ.

ROSÆ CENTIFOLIÆ PETALUM.—Pale-rose petal is obtained from the cabbage rose, *Rosa centifolia* Linn. (Fam. Rosaceæ), a shrub universally cultivated as a garden plant. The petals are large, thin, ovate and orbicular with a yellow claw, many of them being metamorphosed stamens. They are pale pink in colour and have a fragrant odour. Pale-rose petal contains a small quantity of volatile oil and a trace of a bitter principle.

Preparations

Confectio Rosæ Gallicæ, B.P.C.—(Conf. Ros. Gall.)—Confection of Roses. Fresh red-rose petal and sucrose beaten together.

This confection was included in the British Pharmacopœia, 1914.

Infusum Rosæ Acidum Concentratum, B.P.C.—(Inf. Ros. Acid. Conc.)—Concentrated Acid Infusion of Roses. About 1 in 5. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh acid infusion of roses, and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Infusum Rosæ Acidum Recens, B.P.C.—(Inf. Ros. Acid. Rec.)—Fresh Acid Infusion of Roses. Red-rose petal, dried, 1 in 40, with dilute sulphuric acid, 1 in 80. When acid infusion of roses or Infusum Rosæ Acidum is prescribed, fresh infusion not being specified, either Infusum Rosæ Acidum Recens or Infusum Rosæ Acidum Concentratum suitably diluted, may be dispensed. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This infusion was included in the British Pharmacopœia, 1914, *under the name of Infusum Rosæ Acidum.*

Syrupus Rosæ, B.P.C.—(Syr. Ros.)—Syrup of Rose. A solution of sucrose in an aqueous infusion of red-rose petal, acidified with dilute sulphuric acid. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This syrup, without the addition of dilute sulphuric acid, was included in the British Pharmacopœia, 1914.

RUBRUM SCARLATINUM

(Rub. Scarlat.)

Scarlet Red

Synonyms—Biebrich Scarlet R. Medicinal; Sudan IV.

Scarlet red is *o*-tolueneazo-*o*-tolueneazo-β-naphthol, $C_{24}H_{20}ON_4$, (Colour Index No. 258), and may be prepared by coupling diazotised *o*-aminoazotoluene with betanaphthol. It occurs as a dark, reddish-brown powder which melts between 165° and 185°. It dissolves in sulphuric acid, yielding a bluish-green solution, which gives a red precipitate on dilution.

Insoluble in water; soluble in alcohol, ether and fats.

Standard.—Scarlet red leaves not more than 10 per cent. of sulphated ash.

Action and Uses.—Scarlet red is used to promote the growth of epithelium in the treatment of wounds, burns and ulcers. It is generally applied as an ointment of from 1 to 8 per cent. strength, the basis of which may be lanolin or paraffin, and should be of such consistency

that the ointment adheres to the dressing when it is removed. This ointment is not applied to fresh wounds, and for granulating wounds only thin layers are used. An 8 per cent. ointment is irritant, and erosions and systemic effects have resulted from its use. For corneal abrasions and corneal ulcers a 1 per cent. ointment in soft paraffin is preferable. An alkaline alcoholic solution of scarlet red is used as a stain in microscopy for the identification of oil.

OIL SCARLET.—Oil scarlet (Colour Index No. 248), or Sudan III, is benzeneazobenzeneazo-β-naphthol, $C_{22}H_{16}ON_4$. It occurs as a reddish-brown powder which crystallises from acetic acid in brown plates with a green metallic lustre. It dissolves in sulphuric acid yielding a bluish-green solution which gives a red precipitate on dilution, and melts between 155° and 195°. It is insoluble in water but soluble in alcohol, ether and fats. Oil scarlet is said to have the same action as scarlet red and is sometimes used as a substitute for it.

TRYPAN BLUE.—Trypan blue (Colour Index No. 477), $C_{34}H_{24}O_{14}N_6S_4Na_4$, is the sodium salt of ditolyldisazobis-8-amino-1-naphthol-3 : 6-disulphonic acid. It occurs as a bluish-grey powder, soluble in water, forming a violet solution; insoluble in alcohol. The aqueous solution produces a violet precipitate with excess of hydrochloric acid, a violet solution and blue precipitate with sodium hydroxide solution and a greenish-blue solution with sulphuric acid or nitric acid, the solution turning blue and giving a violet precipitate on dilution. Trypan blue has been used in trypanosomiasis, and is said to have been successful in the treatment of canine and bovine piroplasmosis and canine distemper. The dose for a dog weighing from 3 to 5 pounds is from 4 millilitres of a 0·5 per cent. w/v solution given intravenously. Solutions for injection may be sterilised by tyndallisation.

TRYPAN RED.—Trypan red (Colour Index No. 438), is the sodium salt of 3-sulphodiphenyldisazobis-β-naphthylamine-3 : 6-disulphonic acid. It occurs as a brown powder, soluble in water forming a red solution. The aqueous solution produces a blue precipitate with hydrochloric acid but is unaltered with acetic acid. Trypan red has been used in trypanosomiasis.

Preparation

Unguentum Rubri Scarlatine, B.P.C.—(Ung. Rub. Scarlat.)—Ointment of Scarlet Red. *Syn.*—Unguentum Rubrum. Scarlet red, 5 per cent., in simple ointment.

RUTA
(Rut.)

Rue

Synonyms—Rutæ Herba; Herbygrass.

Rue consists of the dried herb, *Ruta graveolens* Linn. (Fam. Rutaceæ), a perennial undershrub indigenous to Southern Europe, but commonly cultivated in Britain. It should be **stored** in closed containers.

The stem is cylindrical, branched and smooth. The leaves are bluish-green, alternate, bipinnate or tripinnate, with oblanceolate segments, wedge-shaped below, and punctate from the presence of oil glands in the mesophyll. The flowers are greenish-yellow, the parts being in fours, and in the terminal flowers in fives, the petals concave and

incurved at the tips. The odour is strong and characteristic, and the taste pungent and aromatic. The fruits are sub-spherical, brownish-green capsules, 5 to 7 millimetres in diameter, rough externally and four- or five-lobed at the apex.

Rue **contains** about 0·1 per cent. of volatile oil, which is contained in glands distributed over the entire plant. It also contains a yellow, crystalline body, rutin (rutic acid, sophorin, phytomelin, melin), $C_{27}H_{30}O_{16}$, melting-point, 188° to 190°, which yields, on hydrolysis with dilute acids, quercetin, dextrose and rhamnose.

Standard.—Rue contains not more than 2 per cent. of foreign organic matter.

Action and Uses.—The properties of rue are virtually those of the volatile oil. The herb is sometimes employed in the form of infusion as an emmenagogue.

SABAL
(Sabal)
Sabal

Synonym—Saw Palmetto.

Sabal consists of the partly dried, ripe fruits of *Serenoa serrulata* Hook. f. (Fam. Palmæ), a fan palm which flourishes on the Atlantic coast of the United States of America from South Carolina to Florida.

The fruits are ovoid, about 20 millimetres long and 12 millimetres in diameter, externally brownish-black and smooth. The surface is slightly oily, even, or with large irregular depressions and ridges. The base shows either a short stalk or the small depressed scar left by its removal. A thin, tough epicarp, a soft sarcocarp, about 1 millimetre thick, and a thin, friable, smooth, brown endocarp enclose a hard, ovoid, reddish-brown seed, about 15 millimetres long and 6 millimetres in diameter. The odour is strongly aromatic and fruity, and the taste is sweetish, acrid and oily.

Sabal **contains** about 1·5 per cent. of a brownish-yellow to dark red fixed oil.

Action and Uses.—Sabal is reputed to have a stimulant action upon the mucous membrane of the genito-urinary tract, this action being ascribed to the oil; it is therefore employed in sub-acute gonorrhœa and gleet, as well as in chronic and sub-acute cystitis. The drug is best **administered** in the form of liquid extract, which is sometimes combined with oil of sandal wood in a miscible form.

Dose.– 1 gramme (15 grains).

Preparation

Extractum Sabal Liquidum, B.P.C.—(Ext. Sabal Liq.)—Liquid Extract of Sabal. *Syn.*—Liquid Extract of Saw Palmetto. 1 in 1. Dose.– 0·6 to 1·5 millilitres (10 to 25 minims).

SABINA
(Sabin.)
Savin

Synonyms—Sabinæ Cacumina; Savin Tops; Sabinæ Herba.

Savin consists of the fresh or dried, young shoots of *Juniperus Sabina* Linn. (Fam. Pinaceæ), a small evergreen shrub indigenous to Southern Europe and cultivated in England. It is collected in the early summer.

The twigs are slender, sub-quadrangular, and densely covered with closely appressed, rhomboidal leaves, mostly in opposite and decussate pairs. The leaves, about 2 millimetres long, are usually adnate to the stem for a considerable portion of their length, and entirely appressed or sometimes strongly reflexed in the upper part. The apex is bluntly acute and, of the older twigs, subulate and spreading. At the centre of the outer (under) surface of each leaf is a solitary, large, oval depression, marking the position of a large oil gland; sub-spherical, drooping galbuli, about 5 to 8 millimetres in diameter, may be present in small numbers. The taste is acrid and bitter, and the odour strong, fœtid and characteristic.

The diagnostic **microscopical** characters are the stomata on the lateral parts only of the outer (under) surface of the leaves and near the central line on the inner (upper) surface, the guard-cells being lignified and the ostioles parallel to the axis of the leaf; the hypoderma, lignified and fibrous; on each side of the midrib, the lignified transfusion cells with bordered pits; the absence of stone cells; the minute prisms of calcium oxalate in the cuticle of the zone devoid of stomata.

The fresh drug **contains** from about 2 to 4 per cent. of volatile oil, together with tannin and resin.

Substitutes.—Young shoots of *Juniperus Phœnicea* Linn. are frequently substituted in France for savin. They are distinguished by the presence of lignified stone cells in the mesophyll and by differences in the characters of the volatile oil. *Juniperus virginiana* Linn. may be recognised by the transverse band of stomata below the level of the oil gland and by the small proportion (about 0·2 per cent.) of volatile oil which it contains.

Action and Uses.—The properties of savin are those of its volatile oil. Internally, it is a powerful gastro-intestinal irritant, large doses causing gastro-enteritis, hæmaturia and congestion of the pelvic organs. It is employed in small doses as an emmenagogue, acting reflexly by its irritation during excretion, but it must be given with caution. Its use as an abortifacient has often led to poisoning, with vomiting, severe diarrhœa, hæmaturia and, in severe cases, coma and death in three or four days. Externally, in the form of an ointment (1 in 10) prepared by digesting savin in a melted mixture of benzoinated lard and yellow beeswax, it is sometimes employed as an irritant to promote discharge from ulcers and blisters. Savin is generally

administered as oil of savin given on sugar. A tincture (1 in 8), dose, 20 to 60 minims, was employed formerly.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

SACCHARINUM
(Saccharin.)

Saccharin

$C_7H_5O_3NS = 183·1$

Synonym—Gluside.

Saccharin, or *o*-benzoicsulphinide, may be prepared by treating toluene with chlorosulphonic acid, thus forming a mixture of *o*- and *p*-toluenesulphochlorides, from which, on cooling, the para compound is eliminated by crystallisation. The ortho compound is then treated with ammonia whereby *o*-toluenesulphonamide, $C_6H_4(CH_3)SO_2NH_2$, is formed. This is oxidised with potassium permanganate and the solution is filtered from manganese hydroxides. On acidifying the filtrate, saccharin separates. It occurs as a light, white, microcrystalline powder. When 0·02 gramme is heated with 0·04 gramme of resorcinol and 0·5 millilitre of sulphuric acid until a green colour is produced, cooled, diluted with water and an excess of sodium hydroxide solution added, a fluorescent green solution is produced. When a small quantity in sodium hydroxide solution is evaporated to dryness, fused until no more ammonia is evolved, cooled, dissolved in water and neutralised with hydrochloric acid, on the addition of a few drops of ferric chloride solution to the filtered liquid a violet colour is produced. When a small quantity is boiled for ten minutes with dilute hydrochloric acid and evaporated to dryness, the residue on treatment with phenol and phosphorus pentoxide produces a red colour, and on dissolving this in water a yellow liquid is formed, which changes to bluish-red on the addition of alkali. Saccharin is about 550 times sweeter than sucrose.

Soluble in water (1 in 400), boiling water (1 in 28), alcohol (1 in 38) and glycerin (1 in 50); slightly soluble in ether and chloroform; very soluble in dilute solution of ammonia and in solution of sodium bicarbonate.

Standard.—Saccharin, determined by the method of the British Pharmacopœia for Saccharinum Solubile, contains not less than 97 per cent. of $C_7H_5O_3NS$; each millilitre of N/10 sulphuric acid is equivalent to 0·01831 gramme of $C_7H_5O_3NS$. Melting-point, not below 225°.

Action and Uses.—Saccharin is used as a sweetening agent and as a substitute for sugar in diabetes, obesity and generally where the use of sugar is undesirable. It is excreted unchanged in the urine. It is commonly employed in the form of soluble saccharin, which is more palatable, and has not the unpleasant after-taste of saccharin. For use

in dispensing Elixir Saccharini is suitable, the addition of 1 per cent. of this preparation to mixtures, etc., generally being sufficient.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

Preparation

Elixir Saccharini, B.P.C.—(Elix. Saccharin.)—Elixir of Saccharin. *Syn*—Elixir Glusidi; Elixir of Gluside. Saccharin, 1 in 20, with sodium bicarbonate, alcohol (90 per cent.) and distilled water. Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

SACCHARINUM SOLUBILE

(Saccharin. Solub.)

Soluble Saccharin

$C_7H_4O_3NSNa,2H_2O = 241·1$

Soluble saccharin is the sodium derivative of *o*-benzoicsulphinide, and may be obtained by neutralising saccharin with sodium hydroxide or sodium bicarbonate. It occurs as a white, crystalline powder which is odourless or has a faint, aromatic odour, and an intensely sweet taste, even in considerable dilution. It responds to the tests with resorcinol and sulphuric acid and with ferric chloride solution described under Saccharinum. On ignition, it yields a residue containing sodium sulphate.

Soluble in water (1 in 1·5 at 25°) and alcohol (95 per cent.) (1 in 50 at 25°).

Standard, B.P.—Soluble saccharin contains not less than 98 per cent. of $C_7H_4O_3NSNa,2H_2O$. Lead limit, 10 parts per million. The aqueous solution is slightly acid to litmus. The separated saccharin, when washed and dried, has a melting-point not lower than 226°. It complies also with a test for absence of benzoate and salicylate, and with a limit test for *p*-sulphaminobenzoic acid.

Action and Uses.—Soluble saccharin is more suitable than saccharin as a sweetening agent. It is used in the form of tablets, each containing the equivalent of 0·015 to 0·03 gramme (¼ to ½ grain) of saccharin.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

SAFROLUM

(Safrol.)

Safrole

$C_{10}H_{10}O_2 = 162·1$

Synonym—Safrol.

Safrole is the methylene ether of an allyl catechol. It is the chief

constituent of oil of sassafras, in which it exists to the extent of about 80 per cent., and it occurs also in other volatile oils. It is obtained almost entirely from essential oil of camphor by fractional distillation, collecting the fraction boiling at about 230° and purifying by repeated refrigeration and crystallisation. Safrole occurs at ordinary temperatures as a colourless or faintly yellow liquid, having a characteristic and pleasant sassafras-like odour, a sharp taste, and a neutral reaction. It is optically inactive. It crystallises in well-defined, colourless, monoclinic crystals, and boils at about 233°. Heated with alcoholic potassium hydroxide solution, *iso*safrole is formed which boils at 246° to 248°. Both bodies dissolve in concentrated sulphuric acid, giving an intense red colour. Safrole resists reduction with sodium, but *iso*safrole is readily reduced to dihydrosafrole, $C_{10}H_{12}O_2$. On oxidation with chromic acid mixture, safrole yields piperonal, or heliotropin, and piperonylic acid. Careful oxidation with potassium permanganate first converts it into a glycol, and on further oxidation into homopiperonylic acid.

Standard.—Safrole, determined by the method of the British Pharmacopœia for Oleum Anisi, has a melting-point not below 11° and a congealing-point not below 10°. Specific gravity, 1·104 to 1·107. Refractive index at 20°, 1·536 to 1·539. It is soluble in 3 volumes of alcohol (90 per cent.; specific gravity, 0·8334 to 0·8340) and in 10 volumes of alcohol (80 per cent.; specific gravity, 0·8634 to 0·8640).

Action and Uses.—Safrole has virtually the properties of oil of sassafras, and is used for similar purposes. It is rarely given internally, but it is sometimes employed, mixed with 2 or 3 parts of camphorated oil or liniment of methyl salicylate, as an anodyne liniment in chronic rheumatism. Safrole is also used as a parasiticide; it may be applied to the hair with a brush, leaving the skin untouched, thereby preventing undue absorption and irritation.

HELIOTROPINUM.—Heliotropin, or piperonal, $C_8H_6O_3$, may be obtained by the oxidation of *iso*safrole, which is prepared from safrole by treatment with caustic alkali. It occurs as a white, crystalline solid, having a powerful, sweet odour and melting at 37°. It is used in perfumery.

SALICINUM
(Salicin.)

Salicin

$C_{13}H_{18}O_7 = 286·1$

Salicin, $C_6H_{11}O_5·O·C_6H_4·CH_2OH$, is a crystalline glycoside obtained from the bark of various species of *Salix* and of *Populus*; a considerable quantity is obtained from the bark of *Salix fragilis* Linn., which is largely grown in Belgium, and contains about 3 per cent. of salicin. The bark of *S. purpurea* Linn. is particularly rich in salicin, containing

6 or 7 per cent., but the former bark is more commonly used. It may be extracted by heating a strong decoction of the bark with lead oxide, adding sulphuric acid and barium sulphide, filtering, evaporating to a syrupy consistence, and setting aside for the salicin to crystallise; it may be purified by recrystallisation. Salicin occurs as colourless crystals or as a white, crystalline powder, without odour but having a bitter taste. The aqueous solution is neutral to litmus. When salicin is heated in a test-tube until it begins to char, a violet colouration is produced on the addition of a small quantity of water and a drop of ferric chloride solution, due to the formation of salicyl alcohol (saligenin). When warmed with dilute acids, salicin is hydrolysed with formation of saligenin. It gives a blood-red colouration when moistened with sulphuric acid, the colour disappearing on adding water. When warmed with potassium dichromate and dilute sulphuric acid, the characteristic odour of salicylic aldehyde is evolved.

Soluble in water (1 in 28) and alcohol (90 per cent.) (1 in 80); insoluble in ether and chloroform.

Standard, B.P.—Salicin has a melting-point of 199° to 201°. Specific rotation in 3 per cent. w/v aqueous solution, −63° to −66°. Ash, not more than 0·05 per cent. It complies also with a test for absence of salicylic acid and of saligenin.

Action and Uses.—The action of salicin is virtually that of salicylic acid. It is less irritant to the mucous membranes than the salicylates. It is in part excreted unchanged in the urine and in part as salicyl alcohol, salicylic acid and salicyluric acid. Given in solution, it is bitter, increasing the flow of saliva and improving the appetite. It is used as a specific in acute rheumatism, for which purpose it is less depressing than salicylic acid and its action is more prolonged. It is also employed in influenza in doses up to 20 grains given at short intervals. It is best **administered** in solution in mixture form, but it may also be given in cachets or tablets.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

SALIX
(Salix)
Willow

Synonyms—Salicis Cortex; Willow Bark.

Willow consists of the bark of *Salix alba* Linn. and other species of *Salix*, notably *S. fragilis* Linn., *S. purpurea* Linn. and *S. pentandra* Linn. (Fam. Salicaceæ), trees indigenous to Britain and to Central and Southern Europe.

The bark occurs in thin, channelled pieces about 1 to 2 centimetres wide and from about 1 to 2 millimetres thick. The outer surface is glossy, smooth or slightly wrinkled longitudinally, or dull and rugged in older barks, brown, grey, or greenish in colour. The inner surface is

striated, fibrous, and yellow, pale red, or brown in colour. The fracture is short in the outer part and fibrous in the phloem, and the smoothed, transverse section exhibits under a lens numerous minute, tangentially arranged groups of bast fibres. The odour is slight, and the taste is astringent and slightly bitter.

The diagnostic **microscopical** characters are the 2 or 3 rows of cork cells, having strongly thickened and suberised, but not lignified, outer walls, which bulge outwards; the absence of stone cells from the phloem; the presence of prismatic crystals of calcium oxalate.

Willow **contains** tannin and salicin, the proportions of which are very variable.

Action and Uses.—Willow has been employed as a bitter and astringent.

SALIX NIGRA.—Black willow, or pussy-willow bark, is obtained from *Salix discolor* Muehl., a tree 15 to 25 feet high, common in North America. The bark occurs in long, thin, tough, fibrous strips, covered externally with a thin, brownish or greenish-brown, wrinkled cork; the inner surface is pale reddish-brown in colour. It has a bitter, astringent and somewhat aromatic taste. Black willow contains from 3·3 to 4·3 per cent. of tannin, and about 1 per cent. of salinigrin, a white, crystalline glycoside, soluble in water (1 in 52) and alcohol (1 in 218), melting-point, 195°; specific rotation, −87·3°; on hydrolysis it yields dextrose and *p*-hydroxyacetophenone; it may readily be distinguished from salicin by yielding a colourless solution with sulphuric acid. The bark of *Salix nigra* Marsh is darker, thicker, and less bitter than that of *S. discolor*. Black willow has astringent and sedative properties, and has been prescribed to relieve ovarian pain. It is administered as liquid extract in mixtures with other sedatives.

Preparation

Extractum Salicis Nigræ Liquidum, B.P.C.—(Ext. Salic. Nig. Liq.)—Liquid Extract of Black Willow. 1 in 1. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

SALOL
(Salol)
Salol

$C_{13}H_{10}O_3 = 214·1$

Synonym—Phenyl Salicylate.

Salol, $C_6H_4(OH)\cdot COOC_6H_5$, is the phenyl ester of salicylic acid, and may be prepared by treating a mixture of sodium salicylate and sodium phenate, in molecular proportions, with phosphoryl chloride. The product is washed with water until practically free from chlorides and recrystallised. It occurs in the form of colourless, almost tasteless, translucent, needle-shaped crystals, or as a white, microcrystalline powder, having a very faint aromatic odour, recalling that of wintergreen. An alcoholic solution forms an emulsion with water, due to suspension of the salt in a very finely divided state. The alcoholic solution is neutral to litmus paper; it yields a white precipitate with bromine solution and a violet colouration with ferric chloride solution.

When 0·2 gramme is boiled with 5 millilitres of sodium hydroxide solution, and the solution cooled and acidified with hydrochloric acid, an odour of phenol is developed and a white, crystalline precipitate of salicylic acid is produced.

Almost **insoluble** in water; soluble in alcohol (1 in 15); very soluble in boiling alcohol, ether (3 in 1), chloroform (3 in 1), liquid paraffin (1 in 10), almond oil (1 in 4), benzene, turpentine, balsam of copaiba, sandal wood oil and other fixed and volatile oils; very slightly soluble in glycerin.

Standard.—Salol melts between 42° and 43·5°. Ash, not more than 0·05 per cent. 1 gramme complies with the limit test for chlorides. 1 gramme complies with the limit test for sulphates. Shake 1 gramme with 20 millilitres of water, and filter; the filtrate produces no violet colouration on the addition of one drop of ferric chloride solution (limit of free phenol and free salicylic acid). 1 gramme suspended in 20 millilitres of water requires not more than 0·2 millilitre of N/10 sodium hydroxide for neutralisation, using phenol red as indicator.

Action and Uses.—Salol, when administered internally, is split up by the alkaline secretion of the small intestine into salicylic acid and phenol, both these bodies being excreted by the urine, which assumes a very dark colour. The effects of salol are due to the products of its decomposition. It is given mostly for its salicylic acid content, but the phenol produced is the cause of the poisoning that sometimes occurs, and this action should, therefore, not be overlooked. Salol is used principally as an intestinal antiseptic. Doubt has, however, been expressed as to whether it exerts much antiseptic action in the intestine, since, measured by the amount of indican in the urine, intestinal putrefaction does not appear to be diminished by its administration. Doses sufficiently large to be effective may produce toxic effects. It should not be employed when there is renal inflammation. Salol is employed as a substitute for the alkali salicylates in acute and chronic rheumatism.

Salol may be **administered** in cachets, or suspended in milk, or in mixtures with compound powder of tragacanth. It is given in tablets, sometimes with betanaphthol, but the tablets, unless lightly compressed, may pass through the alimentary tract undissolved. An emulsion may be prepared by dissolving salol in oil and emulsifying with acacia. Liquor Salolis Compositus, diluted with water, is used as a mouth-wash; Pigmentum Salolis is used for septic tonsils and inflammatory conditions of the throat. Salol is also used as a coating for pills, to render them insoluble in the stomach.

Dose.—0·3 to 1·2 grammes (5 to 20 grains).

Preparations

Liquor Salolis Compositus, B.P.C.—(Liq. Salol. Co.)—Compound Solution of Salol. *Syn.*—Salol Mouth Wash. Salol, 2·5 per cent. w/v, with thymol, oil of peppermint, oil of anise, elixir of saccharin and alcohol (90 per cent.).

Pigmentum Salolis, B.P.C.—(Pig. Salol.)—Salol Paint. Salol, 1 in 300, in glycerin and alcohol (90 per cent.).

SALVIA
(Salv.)
Sage

Sage consists of the dried leaves of *Salvia officinalis* Linn. (Fam. Labiatæ), a perennial plant indigenous to Southern Europe, and largely cultivated.

The leaves are greyish-green, petiolate, elliptical or ovate-oblong, about 3 to 7 centimetres long, obtuse or subacute at the apex, rounded or subcordate at the base, thick, finely crenulate, very pubescent and conspicuously reticulately veined. The odour is aromatic and the taste bitter and somewhat astringent.

The diagnostic **microscopical** characters are the very numerous, long, narrow, uniseriate, 2 to 6-celled, covering trichomes with thick walls and sharply acute apices; the pieces of epidermis showing stomata of the caryophyllaceous type; the occasional, large, rosette-shaped, glandular trichomes with unicellular stalks and the small, glandular trichomes with a unicellular or bicellular head.

Sage **contains** volatile oil, 1 to 2·5 per cent., containing salvene, pinene, camphor, cineole, borneol, thujone, salvene esters and sesquiterpenes.

Standard.—Sage contains not more than 3 per cent. of foreign organic matter. Ash, not more than 8 per cent.

Sage, in powder (Pulvis Salviæ : Pulv. Salv.), contains the constituents and possesses the diagnostic microscopical characters of Salvia, and complies with the limit for ash of the unground drug.

Action and Uses.—Salvia has carminative properties and has been used in dyspepsia, but is mostly employed for culinary purposes.

CLARY SAGE or muscatel sage, from *Salvia Sclarea* Linn., indigenous to Northern Africa and Southern Europe and cultivated in the South of France, has broadly cordate-ovate leaves with pointed apices. The fresh, flowering tops yield about 0·1 per cent. of an essential oil, having an agreeable, aromatic, lavender-like odour, and containing linalol and esters.

SAMBUCUS
(Sambuc.)
Sambucus

Synonyms—Sambuci Flores; Elder Flowers.

Sambucus consists of the fresh or dried corollas and stamens from the flowers of *Sambucus nigra* Linn. (Fam. Caprifoliaceæ), a small tree or shrub indigenous to Europe, Western Asia and West Africa. The white or cream coloured flowers are borne in corymbose cymes from 15 to 20 centimetres in diameter, which are collected and thrown

into heaps; after a few hours the corollas become loosened and can then be removed by sifting.

The corollas are creamy-white, rotate, 5-lobed, gamopetalous, 1 to 3 millimetres in diameter, having 5 epipetalous stamens with short filaments and yellow anthers. A small proportion of pedicels and trilocular ovaries is commonly present. The odour of the fresh flowers is scarcely pleasant. The taste is slightly bitter and mucilaginous. The dried flowers have the form of brownish-yellow, shrivelled balls, which show the characters of the fresh flowers when soaked in water; the odour of the dried flowers is pleasant, and the taste is slightly bitter. Sambucus **contains** a trace of volatile oil, which is of buttery consistence at ordinary temperatures.

Substitute.—Elder flowers, preserved with 50 to 100 per cent. of common salt, are agreeably fragrant and are used for the preparation of the oil and the triple water of commerce.

Action and Uses.—Sambucus is used in the preparation of Aqua Sambuci. Elder-flower water is mildly astringent, and is used as a vehicle for lotions for the eyes and skin. The product gradually acquires an agreeably aromatic odour, and it is preferable not to use it until this change has taken place. Elder-flower ointment, prepared by heating fresh sambucus in melted lard, has been used as a basis for pomades and cosmetic ointments.

SAMBUCI FOLIUM.—Sambucus leaf consists of the fresh leaves of *Sambucus nigra* Linn. The leaves are opposite and decussate in arrangement; they are imparipinnate with 2 to 4, usually 2, pairs of leaflets, having very short petioles. The leaflets are from 3 to 8 centimetres long, ovate to lanceolate, glabrous, with an acuminate apex and a serrate margin; the upper surface is dark green and the under surface paler. Sambucus leaf contains an alkaloid, sambucine, a purgative resin, and the cyanogenetic glycoside, sambunigrin, which is isomeric with mandelonitrile glycoside or prunasin. Sambunigrin crystallises in white, felted needles, and is readily hydrolysed by emulsin, which is also present in the leaves, with production of hydrocyanic acid, benzaldehyde, and dextrose; by the action of small quantities of barium hydroxide it is readily converted into prulaurasin. Sambucus leaf yields about 0·16 per cent. of hydrocyanic acid. It also contains sucrose, invertin, a considerable quantity of potassium nitrate, and a crystalline substance, eldrin, which has also been found in other white flowering plants. The leaves have been used in the preparation of Unguentum Sambuci Viride and Oleum Sambuci. Green elder ointment was formerly prepared by digesting 1 part of the fresh leaves in 2 parts of a mixture of lard and suet; it is now commonly replaced by Unguentum Sambuci. Oil of elder leaves is prepared by digesting 1 part of bruised, fresh elder leaves in 3 parts of linseed oil.

Preparations

Aqua Sambuci, B.P.C.—(Aq. Sambuc.)—Elder-flower Water. Triple elder-flower water diluted, immediately before use, with twice its volume of distilled water.

Aqua Sambuci Triplex, B.P.C.—(Aq. Sambuc. Trip.)—Triple Elder-flower Water. The undiluted elder-flower water of commerce.

Unguentum Sambuci, B.P.C.—(Ung. Sambuc.)—Elder Ointment. Triple elder-flower water, 20 per cent., in simple ointment, coloured with chlorophyll.

SANDARACA
(Sandarac.)
Sandarac

Synonym—Gum Juniper.

Sandarac is the resin obtained by incision from the stem of *Tetraclinis articulata* (Vahl) Masters (Fam. Cupressaceæ), a small tree growing on the mountains of North-Western Africa.

The resin is pale yellow, and occurs in brittle tears from 5 to 20 millimetres long and about 3 millimetres in diameter, usually of cylindrical or stalactitic form, and sometimes united into small masses of 2 or 4 tears each; the fracture is short, and the broken surface clear and vitreous. When chewed, the resin breaks up readily into a sandy powder which does not agglomerate into a plastic mass; the odour and taste are slightly terebinthinate. Specific gravity, about 1·07; melting-point, about 160°. Sandarac is completely **soluble** in alcohol and ether, partly soluble in chloroform, carbon disulphide and oil of turpentine. It leaves only traces of ash when incinerated.

Sandarac **contains** a resin with which is associated about 1 per cent. of volatile oil and traces of a bitter principle. The resin contains 85 per cent. of crystalline, inactive pimaric acid (sandaracopimaric acid), 2 to 3 per cent. of sandaracinic acid, and about 10 per cent. of callitrolic acid, together with a little sandaracoresene. Callitrolic acid is easily converted into the lactone, which is insoluble in alcohol. The acid number obtained by adding excess of alkali and titrating back varies from 90 to 154, the ester number being almost nil; these characters, however, appear to vary a little with the age of the resin.

Substitutes.—Australian sandarac, from *Callitris verrucosa* R.Br., is occasionally exported, but most of it is used in Australia. It closely resembles the genuine, but is often a little softer; from 5 to 22 per cent. dissolves in light petroleum. It contains the same constituents as the African sandarac but a larger proportion of inactive pimaric acid and pinene. Factitious sandarac made from colophony has an acid number of about 175, and is almost entirely soluble in light petroleum, which dissolves but little from sandarac.

Uses.—Sandarac is sometimes employed in alcoholic solution [2 parts of the resin and 1 part of alcohol (90 per cent.)] on cotton wool as a temporary filling for teeth. Its chief use in pharmacy is for the preparation of pill varnishes, but it is used largely as an ingredient of various varnishes.

SANGUINARIA
(Sanguin.)
Sanguinaria

Synonyms—Bloodroot; Blood Root.

Sanguinaria is the dried rhizome of *Sanguinaria canadensis* Linn. (Fam. Papaveraceæ), a herb widely distributed throughout Canada and

the United States of America. It is collected in the autumn, and dried.

The rhizome occurs in dark grey or reddish-brown pieces from 2 to 10 centimetres long and 5 to 15 millimetres in thickness; it is sub-cylindrical, slightly curved or straight, and sometimes somewhat flattened. The surface shows incompletely encircling leaf-scars; the apex is blunt and conical, showing traces of a bud or of the aerial stem. The roots are few, up to 1 millimetre thick, brittle and wiry, and the root-scars are raised. The branches are short and knob-like, arising at right angles to the rhizome. The fracture is short, and the fractured surface sometimes starchy and whitish, with numerous, minute, deep red, secretion cells, or hard and resinous, and of a uniform dark red or brown colour. The odour is slight and the taste bitter and acrid.

Sanguinaria **contains** the alkaloids, sanguinarine, chelerythrine, protopine and α- and β-homochelidonine, a red resin and abundance of starch.

Action and Uses.—Sanguinaria is occasionally employed as an expectorant in chronic bronchitis, and is **administered** as tincture (1 in 10) in doses of 1 millilitre (15 minims).

Dose.—0·06 to 0·3 gramme (1 to 5 grains).

SANGUIS DRACONIS

(Sang. Drac.)

Dragon's Blood

Synonym—Sumatra Dragon's Blood.

Dragon's blood is a resinous secretion found on the fruits of *Dæmonorops propinquus* Becc., *D. Draco* Blume and probably other species of *Dæmonorops* (Fam. Palmæ), rattan palms indigenous to Sumatra and Borneo. The fruits, about the size of a cherry, are enveloped in closely imbricated, hard, yellow scales, which become encrusted with a red resin. The resin is removed by shaking the fruits and sifting, and is then softened by warming and made into elongated, flattened, or rounded masses, the latter frequently bearing the impress of coarse matting in which they have been packed, whilst the former are generally wrapped in a leaf. It is stated that a certain amount of admixture with the milky juice of *Garcinia parviflora* Benth. (Fam. Guttiferæ) occurs.

Dragon's blood occurs in pieces of varying size and shape, frequently in large, rounded lumps weighing up to several pounds, or in rounded, flattened cakes, or occasionally in sticks. The higher grades are of a dull red colour, covered with a dull crimson powder due to friction, and are brittle and friable. The fracture is vitreous, exposing a nearly black surface; thin fragments are translucent, and of a garnet-red colour by transmitted light. When crushed, the resin yields a bright crimson powder. Inferior qualities are duller, tougher and have less powder

on the surface; on crushing, they give a duller crimson or brick-red powder, and they usually contain numerous fragments of fruit scales, etc. The resin is odourless, almost tasteless, gritty when chewed, and melts at about 120°, evolving an odour of benzoic acid. It is entirely soluble in alcohol, but the crude drug may yield from 40 to 50 per cent. of insoluble residue.

The soluble portion of dragon's blood **consists** of about 56 per cent. of a red resin (dracoresinotannol combined with benzoic and benzoylacetic acids), 13 per cent. of a bright yellow, amorphous resene (dracoresene), and 2·5 per cent. of a white, amorphous body (dracoalban). The latter may be detected by boiling 10 grammes of the powdered resin in 50 millilitres of ether, concentrating to 30 millilitres, and pouring into 50 millilitres of dehydrated alcohol; on allowing the mixture to stand for an hour, a white, flocculent precipitate of dracoalban is obtained.

Substitutes.—Socotra dragon's blood, or "Zanzibar drop," from *Dracæna cinnabari* Balf. f. (Fam. Liliaceæ), indigenous to Somaliland, occurs in tears, contains no fruit scales and does not emit an odour of benzoic acid when warmed. The dried juice from the bark of *Pterocarpus Draco* Linn. (Fam. Leguminosæ) is known as American or West Indian dragon's blood, or as West Indian kino.

Standard.—Dragon's blood yields not more than 9 per cent. of ash.

Uses.—Dragon's blood is sometimes used for colouring plasters, but it is much more largely used for colouring lacquers and varnishes. It is also used in zinc line engraving to protect from the action of the acid those parts of the metal not to be etched.

SANTONICA

(Santonic.)

Santonica

Synonyms—Semen Contra; Semen Cinæ; Wormseed.

Santonica consists of the dried, unexpanded capitula of *Artemisia cina* Berg (Fam. Compositæ), a small undershrub which grows plentifully in Turkestan.

The capitulum is from 2 to 4 millimetres long and 1 to 2 millimetres wide, light brown, ovoid and somewhat angular, shining and nearly glabrous. The ovate involucral bracts vary in number from about 14 to 20 (most frequently 16); they are keeled, and bear shining, external glands; their midribs branch freely, and the veinlets are contorted and frequently anastomose; they have no apical, marginal hairs and few cottony hairs. The 3 to 5 florets are minute, tubular and hermaphrodite; the apices of their corolla lobes are never more than slightly papillose and bear no trichomes. The odour is agreeable and aromatic, and the taste is bitter, aromatic and camphoraceous. Portions

of the foliage leaves are always present and afford good diagnostic characters; they have linear-lanceolate pinnæ with a rounded apex and an apiculus; each pinna has lateral veins connecting the midrib with two parallel, sub-marginal veins; numerous sessile glands are present, but long, protective hairs are absent.

Santonica **contains** santonin (2 to 3·5 per cent.), which rapidly diminishes in quantity after the flowerheads have expanded. The drug also contains artemisin, $C_{15}H_{18}O_4$ (melting-point, 200°), which yields a carmine-red solution when boiled with solution of sodium hydroxide, a bitter resin, betaine, choline and a hydrocarbon, $C_{32}H_{66}$. The odour of santonica is due to a yellow volatile oil (2 to 3 per cent., specific gravity, 0·915 to 0·940). The ash is about 10 per cent.

Substitutes.—A variety of wormseed ascribed to *Artemisia brevifolia* Wall. is collected in India and contains a smaller proportion of santonin than santonica. A spurious variety containing no santonin is obtained from the Persian gulf.

Standard.—Santonica contains not less than 2 per cent. of santonin.

Santonica, in powder (Pulvis Santonicæ : Pulv. Santonic.), contains the constituents of Santonica, and complies with the standard for the unground drug.

Assay.—Take 13 grammes, in coarse powder, and shake occasionally for one hour with 130 grammes of chloroform. Filter through cotton wool, and transfer 102·5 grammes of the solution, representing 10 grammes of the drug, to a 200 millilitre tared flask; distil off the chloroform until the residue weighs between 7 and 8 grammes, add 100 grammes of 1·20 per cent. w/v barium hydroxide solution, and heat the flask on a water-bath until all the chloroform is driven off. Filter the liquid, wash the filter with a little boiling water, acidify the filtrate with 5 grammes of 25 per cent. hydrochloric acid, heat on the water-bath for a few minutes and then, when lukewarm, transfer to a separator. Rinse the flask with 20 millilitres of chloroform, add the latter to the separator and shake briskly for two minutes. Separate the chloroform into a 100 millilitre flask and extract the aqueous liquid with two successive portions of 20 millilitres of chloroform. Evaporate the chloroform, take up the residue, with the aid of heat, in 7·5 grammes of dehydrated alcohol, and then mix with 42·5 grammes of hot water. Filter the milky solution immediately into a tared 100 millilitre flask, rinse the filter and flask with two portions, each of 10 millilitres, of a mixture of 3 grammes of dehydrated alcohol and 17 grammes of hot water, and allow the liquid to stand for twenty-four hours. Collect the separated santonin on a tared filter, wash the flask and filter with two portions of 10 millilitres each of a mixture of 3 grammes of dehydrated alcohol and 17 grammes of water, and dry the flask and filter to constant weight. To the weight of santonin obtained add 0·04 gramme, in order to correct for the santonin remaining dissolved in the solution.

Action and Use.—Santonica is used chiefly as the source of santonin. It is sometimes administered in the form of decoction or infusion for the expulsion of round-worms and thread-worms.

SPIGELIA.—Spigelia, Indian pink, or pink root, consists of the dried rhizome and rootlets, or the dried entire plant, of the Carolina pink, *Spigelia marilandica* Linn. (Fam. Loganiaceæ), a native of the Southern United States. The plant is a herbaceous perennial, from 30 to 50 centimetres high, having a smooth, simple stem, rounded below, quadrangular above and bearing a few opposite, sessile, ovate-lanceolate leaves about 7·5 centimetres long. The stem sometimes terminates in a spike of brilliant red flowers. The rhizome is 5 centimetres or more in length and 2 to 3 millimetres in diameter, dark brown externally, tortuous and knotty, and bears numerous slender, wiry rootlets and cup-shaped stem-scars. Internally, the rhizome has a whitish wood and a dark-coloured or decayed pith. The drug has a somewhat aromatic odour and a sweetish but bitter and pungent taste. The chief constituents are the poisonous alkaloid, spigeline, and an acrid, bitter substance soluble in water and alcohol. Spigelia is used as an anthelmintic for round-worms, being administered in powder or as an infusion mixed with purgatives such as senna. Its administration should be followed by a saline purge. Dose.– 2 to 4 grammes (½ to 1 drachm).

SANTONINUM

(Santonin.)

Santonin

$C_{15}H_{18}O_3 = 246·1$

Santonin is a crystalline lactone obtained from santonica and from other species of *Artemisia*. It may be extracted by mixing santonica with milk of lime and decomposing by means of sulphuric acid; santonin crystallises out on cooling the acid liquid, and is washed with ammoniacal water and purified by recrystallisation. It occurs as colourless crystals, without odour and almost tasteless at first but afterwards slightly bitter. Exposure to daylight causes it to assume a yellow colour due to formation of chromosantonin. Alkaline solutions convert santonin into santonates, from which santonic acid may be obtained by shaking with hydrochloric acid and ether. When a trace of santonin is warmed with alcoholic potassium hydroxide solution, a violet-red colour is obtained. When warmed on a water-bath with 5 millilitres of a mixture of equal volumes of sulphuric acid and water to which a trace of ferric chloride has been added, a yellow colouration is produced which changes slowly to red and then violet. Warmed with solution of ethyl nitrite and a few drops of potassium hydroxide solution, a fine rose-red colour is produced. It should be **stored** protected from light.

Soluble in alcohol (90 per cent.) (1 in 44), boiling alcohol (90 per cent.) (1 in 3), chloroform (1 in 2·5) and ether (1 in 140); almost insoluble in water.

Standard, B.P.—Santonin has a melting-point of 171° to 174°. Ash, not more than 0·1 per cent. The 2 per cent. w/v alcoholic solution is clear and neutral to litmus. It complies also with a limit test for readily carbonisable substances.

Action and Uses.—Santonin is used as a vermifuge for ascarides (round-worms). Its action appears not to be that of a direct poison

to the parasites, since they are expelled alive. It causes the worms to migrate to the lower gut, whence they are removed by a suitable purge, either calomel given simultaneously or castor oil given twelve hours after the santonin. It is also used to expel oxyuris (thread-worms), but has no action on tænia (tape-worms). Santonin is liable to be absorbed, giving rise to specific effects on the sense organs, especially the colour sense and central nervous system. Appreciation of colour is disturbed, and illuminated objects appear to have a yellowish tinge, which is sometimes preceded by a faint blue colour. Santonin may also cause headache, nausea and vomiting, or, in large doses, epileptiform convulsions. The absorbed santonin renders the urine an intense yellow colour, if acid, or purplish, if alkaline. Santonin may be **administered** in powders or tablets, one dose each night for three nights, followed each morning by a dose of castor oil. It may be suspended in a mixture with compound powder of tragacanth, or given as Trochisci Santonini. It is often given in tablets with compound powder of scammony or calomel.

Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

Preparations

Tabellæ Santonini et Hydrargyri Subchloridi, B.P.C.—(Tab. Santonin. et Hydrarg. Subchlor.)—Tablets of Santonin and Mercurous Chloride. *Syn.*— Compound Santonin Tablets; Santonin and Calomel Tablets; Tabellæ Santonini Compositæ. Each tablet contains 1 grain of santonin and 1 grain of calomel. Dose.– 1 or 2 tablets.

Tabellæ Santonini et Scammoniæ Compositæ, B.P.C.—(Tab. Santonin. et Scammon. Co.)—Compound Tablets of Santonin and Scammony. Each tablet contains 1½ grains of santonin, 2 grains of compound powder of scammony and ½ grain of calomel. Dose.– 1 tablet.

Trochisci Santonini, B.P.C.—(Troch. Santonin.)—Santonin Lozenges. Each lozenge contains 1 grain of santonin.

This lozenge, containing 0·06 *gramme of santonin, was included in the British Pharmacopœia,* 1914.

SAPO ANIMALIS

(Sap. Animal.)

Curd Soap

Curd soap is a sodium soap prepared from animal fats, and consists chiefly of sodium stearate. It may be prepared by heating the purified animal fat, consisting chiefly of stearin, with sodium hydroxide and water; on adding common salt to the liquid, the soap separates as a curd. Curd soap occurs as a yellowish-white or greyish-white solid, almost free from odour. It becomes plastic when heated, and horny and readily pulverisable when dry.

Soluble in hot water; sparingly soluble in cold water; almost completely soluble in alcohol (90 per cent.).

Standard, B.P.—Curd soap loses, on drying at 110°, not less than 20 per cent. and not more than 30 per cent. of its weight. Curd soap, in powder, loses, on drying at 110°, not more than 5 per cent. of its weight. Solidifying-point of the fatty acids, not less than 42°. It complies also with limit tests for alkali hydroxide and free fatty acid, alkali carbonate, and free fat.

Uses.—Curd soap is a useful pill excipient for resinous substances and volatile oils. A solution containing 4 ounces of curd soap and 6 fluid ounces of glycerin in sufficient water to produce 30 fluid ounces is used to smear over electrodes to ensure good electrical contact in electro-therapeutic practice; it is known as "contact" soap.

Preparation

Emplastrum Saponis Fuscum, B.P.C.—(Emp. Sap. Fusc.)—Brown Plaster of Soap. *Syn.*—Emplastrum Cerati Saponis. It is prepared with curd soap, yellow beeswax, olive oil, lead monoxide and vinegar.

Linimentum Saponis Camphoratum, B.P.C.—(Lin. Sap. Camph.)—Camphorated Soap Liniment. *Syn.*—Solid Opodeldoc. A solid preparation containing curd soap, camphor, oils of thyme and rosemary, dilute solution of ammonia and alcohol (90 per cent.).

SAPO DURUS
(Sap. Dur.)
Hard Soap

Hard soap is a sodium soap prepared from olive oil, and consists chiefly of sodium oleate. It may be prepared by heating olive oil with sodium hydroxide and water; on adding common salt to the liquid, the soap separates as a curd. Hard soap occurs as a yellowish-white, greyish-white, or greenish-white solid, almost free from odour. It becomes plastic when heated, and horny and readily pulverisable when dry.

Soluble in water (1 in 20), boiling water (1 in 1·5); almost completely soluble in alcohol (90 per cent.), and entirely soluble in boiling alcohol (90 per cent.) (1 in 2).

Standard, B.P.—Hard soap loses, on drying at 110°, not less than 20 per cent. and not more than 30 per cent. of its weight. Hard soap, in powder, loses, on drying at 110°, not more than 5 per cent. of its weight. The separated fatty acid has a solidifying-point of 18° to 23°, a refractive index at 40° of 1·454 to 1·458, an acid value of 195 to 205, and an iodine value of 83 to 92; it complies with tests for the absence of cottonseed oil, sesame oil and arachis oil. Hard soap complies also with limit tests for alkali hydroxide and free fatty acid, alkali carbonate, free fat, and for chloride and other alcohol-insoluble substances.

Action and Uses.—Hard soap is given internally in doses of 0·3 to 1 gramme (5 to 15 grains) as a cholagogue and laxative, also to increase the activity of other laxatives, such as aloin, ipomœa, jalap and rhubarb. Hard soap forms a basis for many pills and plasters. It is a useful pill excipient for resinous substances and volatile oils. Soap plaster is used as a protection for corns and bunions, and in place of plaster of colophony where the latter is too adhesive.

Preparations

Emplastrum Saponis, B.P.C.—(Emp. Sap.)—Plaster of Soap. Hard soap, about 1 in 7, with plaster of lead and colophony.

This plaster was included in the British Pharmacopœia, 1914.

Pilulæ Saponis cum Opio, B.P.C.—(Pil. Sap. c. Opio)—Soap Pills with Opium. *Syn.*—Pilulæ Saponis Compositæ; Compound Soap Pills. Each pill contains $\frac{2}{3}$ grain of powdered opium and about 1 grain of hard soap. Dose.—1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914, *under the name of Pilula Saponis Composita.*

SAPO KALINUS

(Sap. Kalin.)

Potash Soap

Synonym—Linseed Oil Soap.

Potash soap may be prepared by heating linseed oil with potassium hydroxide solution and a little alcohol until a small portion of the mixture is found to dissolve in boiling water without separation of oily drops. It occurs as a soft, unctuous, yellowish-brown mass, with a characteristic odour and an alkaline taste.

Soluble in water (1 in 4) and alcohol (1 in 1).

Standard.—Potash soap, determined by the method of the British Pharmacopœia for Sapo Mollis, yields not less than 44 per cent. of the fatty acids of linseed oil. It complies with the limit tests for chlorides and other alcohol-insoluble substances, alkali hydroxide, alkali carbonate, and free fatty acid in Sapo Mollis. The fatty acid obtained in the assay has an iodine value of 179 to 210.

Uses.—Potash soap is used in the preparation of liquid soaps which are preferred by some surgeons to preparations of soft soap for cleansing the skin before operations.

Preparation

Spiritus Saponis Kalini, B.P.C.—(Sp. Sap. Kalin.)—Spirit of Potash Soap. *Syn.*—Spiritus Saponis Kalini (Hebra). Potash soap, 65 per cent. w/v, in alcohol (90 per cent.), perfumed with oil of lavender.

SAPO MOLLIS
(Sap. Moll.)
Soft Soap

Soft soap is a potassium soap prepared from olive oil, and consists chiefly of potassium oleate. It may be prepared by heating olive oil with potassium hydroxide and water. The soap cannot be precipitated by adding common salt, since this would react to form a sodium soap; hence the mixture is allowed to cool, and the product therefore contains the glycerin formed during saponification. Soft soap occurs as an almost odourless, unctuous substance, varying in colour from yellowish-white or yellowish-brown to green. The tint of soft soap depends on the olive oil employed in making it, but copper compounds and chlorophyll are sometimes added to produce an artificial green colour.

Soluble in water (1 in 4), boiling water (1 in 1) and alcohol (90 per cent.) (1 in 1).

Standard, B.P.—Soft soap yields not less than 44 per cent. of the fatty acids of olive oil, having the characters of the fatty acids described under Sapo Durus. It complies also with limit tests for chloride and other alcohol-insoluble substances, alkali hydroxide, alkali carbonate, free fatty acid, and free fat.

Action and Uses.—Soft soap is used to remove incrustations in chronic scaly skin diseases, such as psoriasis, and to cleanse the scalp previous to the application of antiseptic lotions. A solution in industrial methylated spirit, with the addition of methylated ether, is used by surgeons to cleanse the skin. For rectal administration to remove impacted fæces, a solution of 1 part of soft soap in 30 to 40 parts of warm water is employed. Linimentum Saponis is a mild counter-irritant used to rub sprains, contusions and rheumatic joints, and to dilute more active liniments.

Preparations

Linimentum Saponis, B.P.—(Lin. Sap.)—Liniment of Soap. Soft soap, 8 per cent. w/v, and camphor, 4 per cent. w/v, with oil of rosemary and distilled water, in alcohol (90 per cent.) or industrial methylated spirit suitably diluted.

Liquor Formaldehydi Saponatus, B.P.C.—(Liq. Formaldehyd. Sap.)—Solution of Formaldehyde with Soap. Soft soap, 1 in 2½, and solution of formaldehyde, 1 in 5, in alcohol (90 per cent.) and distilled water.

This solution was included in the British Pharmacopœia, 1914.

Liquor Saponis Æthereus, B.P.C.—(Liq. Sap. Æther.)—Ethereal Solution of Soap. *Syn.*—Ether Soap; Salutio Saponis Ætherea. A solution containing about 40 per cent. of potassium oleate in ether and alcohol (90 per cent.), with oil of lavender.

Liquor Saponis Antisepticus, B.P.C.—(Liq. Sap. Antisept.)—Antiseptic Solution of Soap. *Syn.*—Antiseptic Ethereal Soap; Solutio Saponis Antiseptica. Ethereal solution of soap with 0·05 per cent. w/v of mercuric iodide, and potassium iodide.

Spiritus Saponatus, B.P.C.—(Sp. Sap.)—Soap Spirit. Soft soap, 65 per cent., w/v, in alcohol (90 per cent.).

SAPONINUM
(Saponin.)
Saponin

Synonyms—Quillaic Acid; Quillain.

Saponin is a colloidal glycoside or mixture of glycosides obtained from quillaia bark. The commercial article is a mixture obtained by boiling the powdered bark with water until exhausted, evaporating the decoction thus obtained to dryness, and boiling the extract with alcohol under a reflux condenser. This solution deposits the "saponin" on cooling, and the process of boiling and cooling may be repeated until the product is perfectly white. It occurs as an amorphous powder, having a sweetish, afterwards bitter, acrid taste, accompanied by a burning sensation; it is intensely irritating and sternutatory. The solubility in water is increased by the addition of a small amount of alkali. An aqueous solution (1 in 1000) froths like soap solution, the froth being very persistent, but easily dispersed by alcohol or ether. When treated successively with 2 drops of acetic anhydride and 1 drop of sulphuric acid, saponin develops a bright red colour. When boiled with dilute mineral acid, it hydrolyses and produces a sapogenin which is insoluble in water, and a quantitative process of determination is based on this reaction. Commercial saponin contains sucrose, quillaic acid and quillaia-sapotoxin, the last two substances being acrid and poisonous.

Soluble in water and hot alcohol; insoluble in ether, chloroform, benzene and carbon disulphide.

Action and Uses.—Saponin is a powerful irritant to the alimentary canal, and may give rise to toxic symptoms; it has a strongly hæmolytic action on the blood. It is not given medicinally, but is sometimes used to emulsify fixed and essential oils, liquid tar, etc., and as a foam stabiliser in contraceptive tablets and antiseptic stili. It is also used as a frothing agent for various technical purposes.

SAPPAN
(Sappan)
Sappan

Synonym—Sappan Lignum.

Sappan is the heartwood of *Cæsalpinia Sappan* Linn. (Fam. Leguminosæ), a tree indigenous to India.

The wood occurs as orange-red, hard, compact, heavy pieces, sometimes with a little whitish sapwood adhering, or in orange-red chips; it has a close, straight grain, and readily splits longitudinally. A smoothed, transversely cut surface shows well-marked, regular concentric rings, diffusely scattered vessels, and numerous narrow

medullary rays. It is odourless, and has an astringent taste. When chewed, it colours the saliva red, and when lime water is added to a decoction of the wood, a crimson-red colour is developed.

Sappan **contains** a colourless, crystalline principle, brazilin, $C_{16}H_{14}O_5$, also obtained from brazil wood, and allied to hæmatoxylin. Solution of brazilin assumes a carmine-red colour in contact with even traces of caustic alkalis, whereas solution of hæmatoxylin becomes purple. Brazilin is soluble in both alcohol and water.

Action and Uses.—Sappan is used as an astringent in India and other parts of the Empire in place of logwood. It may be **administered** as Decoctum Sappan (1 in 20) in doses of 15 to 60 millilitres ($\frac{1}{2}$ to 2 fluid ounces).

SARSA
(Sars.)
Sarsaparilla

Synonym—Sarsæ Radix.

Sarsaparilla consists of the dried root and rootlets of *Smilax ornata* Lem. (Fam. Liliaceæ), a climbing plant growing in Costa Rica, and of *S. medica* Schecht and Cham., indigenous to Mexico. The former is known commercially as Jamaica, or Costa Rica, sarsaparilla, and the latter as Mexican sarsaparilla.

Jamaica sarsaparilla occurs in bundles about 45 centimetres long and 10 to 12 centimetres wide, consisting of numerous long, slender roots and fibrous rootlets, doubled up and bound loosely with a long root of the same plant. The roots are deeply furrowed longitudinally, almost free from transverse cracks, from 3 to 5 millimetres in thickness, reddish-brown in colour and very tough, breaking with difficulty. The transverse section shows a brown cortex, a yellowish lignified ring containing large xylem vessels, and a central parenchymatous pith which contains starch. Mexican sarsaparilla consists of portions of rhizome with roots attached; it is not made into bundles. The roots are dark grey in colour, with transverse cracks and deep, longitudinal wrinkles. The drug has a faintly bitter taste, but is without odour.

The diagnostic **microscopical** characters are the thick-walled cells of the exodermis; the cortical parenchyma, containing occasional starch grains and, in certain cells, bundles of raphides of calcium oxalate; the cells of the endodermis, measuring about 25 microns across, nearly square in transverse section, and having uniformly thickened walls in Jamaica sarsaparilla, and showing a horse-shoe thickening in Mexican sarsaparilla; the large vessels of the xylem.

Sarsaparilla **contains** sarsasaponin, $C_{44}H_{76}O_{20},7H_2O$, a crystalline glycoside yielding sarsasapogenin and dextrose on hydrolysis. Sarsapic

acid, dextrose, fatty acids and starch are also present. It yields to water from 10 to 20 per cent. of extractive; the ash is about 7 per cent.

Substitutes.—Honduras sarsaparilla occurs in bundles about 75 centimetres long and 5 to 6 centimetres wide, closely bound with a long root. It is yellowish-brown in colour, less wrinkled than Jamaica sarsaparilla and contains abundant starch in the cortex. Native Jamaica sarsaparilla, obtained from *S. officinalis* H.B. & K. and cultivated in Jamaica, is pale reddish-brown in colour, bears a few stout rootlets and shows in transverse section a pale cortex separated from a darker stele by a distinct line. It is imported loose in large bales.

Action and Uses.—Sarsaparilla was formerly used in the treatment of chronic rheumatism, skin diseases and syphilis. It is now used as a vehicle, usually in the form of Decoctum Sarsæ Compositum.

Preparations

Decoctum Sarsæ Compositum, B.P.C.—(Dec. Sars. Co.)—Compound Decoction of Sarsaparilla. Sarsaparilla, 1 in 8, with sassafras root, guaiacum wood, mezereon, liquorice and distilled water. When compound decoction of sarsaparilla or Decoctum Sarsæ Compositum is prescribed, either Decoctum Sarsæ Compositum or Decoctum Sarsæ Compositum Concentratum suitably diluted may be dispensed. Dose.– 60 to 240 millilitres (2 to 8 fluid ounces).

Decoctum Sarsæ Compositum Concentratum, B.P.C.—(Dec. Sars. Co. Conc.)—Concentrated Compound Decoction of Sarsaparilla. One part added to seven parts of distilled water yields a preparation which is approximately equivalent in strength to compound decoction of sarsaparilla, but contains about 2·8 per cent. v/v of alcohol (90 per cent.). Dose.– 8 to 30 millilitres (½ to 1 fluid ounce).

SASSAFRAS

(Sassaf.)

Sassafras

Synonyms—Sassafras Cortex; Sassafras Bark.

Sassafras is the dried inner bark of the root of *Sassafras variifolium* (Salisb.) O. Kuntze (Fam. Lauraceæ), a tree indigenous to the Eastern United States of America.

The drug occurs in cut or broken, channelled, flat or recurved pieces, or occasionally in quills. The pieces or quills are usually from 4 to 15 centimetres long, 1 to 3 centimetres wide, and from 0·5 to 3 millimetres thick. Both surfaces are from pale orange to reddish-brown; the outer surface is somewhat scaly, and bears prominent root-scars or pieces of roots, and occasional patches of grey cork; the inner surface is finely striated longitudinally. The fracture is shortly fibrous. The odour is aromatic, and the taste is aromatic, astringent and mucilaginous.

The diagnostic **microscopical** characters are the almost entire absence of cork cells; the presence in all parts of rounded starch grains up to 20 microns in diameter; the abundant oil cells; the numerous spindle-shaped, yellowish, isolated phloem fibres, about 25 microns in diameter and from 150 to 400 microns long, and having very thick, lignified walls; the absence of crystals of calcium oxalate.

Sassafras **contains** volatile oil, from 3 to 9 per cent., tannin, about 6 per cent., a reddish-brown, altered tannin compound, about 9 per cent., together with resin and starch.

Standard.—Sassafras contains not more than 2 per cent. of adhering wood and other foreign organic matter. Acid-insoluble ash, not more than 5 per cent.

Action and Uses.—Sassafras, by virtue of its volatile oil, has mildly aromatic and carminative properties.

SASSAFRAS MEDULLA.—Sassafras pith is the pith removed from the stem of *Sassafras officinale* Nees and Eberm. collected late in the autumn, after frost, and dried. It occurs in pieces up to 15 centimetres in length and about 5 millimetres in diameter; they are whitish and often curved or coiled, light in weight, and consist of a thin-walled lignified parenchyma. The drug contains mucilage and a trace of volatile oil. Sassafras pith has demulcent properties, and the mucilage prepared from it is sometimes used in eye lotions.

SASSAFRAS RADIX.—Sassafras root is the root of *Sassafras officinale* Nees and Eberm. It is a large, woody, branching root, usually sold in the form of chips and slices about 3 to 5 millimetres in thickness. It is greyish-brown in colour, ring-porous, and shows well marked annual rings; the bark is present in small amount. It contains about 2 per cent. of volatile oil.

SCAMMONIÆ RESINA

(Scammon. Res.)

Scammony Resin

Synonym—Resin of Ipomœa.

Scammony resin is a mixture of resins obtained from ipomœa. It may be extracted by percolating with alcohol. The alcohol is removed by evaporation, and the residual resin washed with boiling water and dried. It occurs in brownish, translucent fragments, breaking with a brittle, resinous fracture, or as a pale brown powder, having a sweet, fragrant, characteristic odour and an acrid taste. Scammony resin contains chiefly the methylpentosides and other glycosides of jalapinolic acid and its methyl ester.

Soluble in alcohol (90 per cent.); wholly or partly soluble in ether; insoluble in water.

Standard, B.P.—Scammony resin loses, on drying at 100°, not more than 5 per cent. of its weight. Ash, not more than 0·5 per cent. Water-soluble matter, not more than 1 per cent. It complies also with tests for the absence of certain other resins and of colophony, and with a limit test for ether-insoluble resins.

Action and Uses.—Scammony resin is a drastic purgative, resembling jalap and colocynth. Its action is rapid, but it may cause nausea and vomiting. Large doses cause acute gastro-intestinal

irritation, with congestion of the pelvic organs. Absorption has been known to occur and to give rise to cystitis and nephritis. The action of scammony resin is greatly facilitated by administration with ox bile or sodium tauroglycocholate, which assists solution. It is employed, usually with other purgatives such as colocynth or jalap, to relieve cerebral congestion by lowering blood pressure, and to remove fluid in dropsical conditions. The resin is of service with anthelmintics, such as santonin, to remove thread-worms and round-worms. It is **administered** in pill form as Pilulæ Scammoniæ Compositæ, and in powders or cachets as Pulvis Scammoniæ Compositus. When prescribed in pills, an equal weight of soap should be added; this assists the preparation of the pill mass, promotes solution in the intestine, and enhances the purgative action of the drug.

Dose.– 0·03 to 0·2 gramme (½ to 3 grains).

Preparations

Pilulæ Scammoniæ Compositæ, B.P.C.—(Pil. Scammon. Co.)—Compound Scammony Pills. Each pill contains 1 grain each of scammony resin, jalap resin and curd soap, and ⅓ grain of ginger. Dose.– 1 or 2 pills.

Pulvis Scammoniæ Compositus, B.P.C.—(Pulv. Scammon. Co.)—Compound Powder of Scammony. Scammony resin, 1 in 2, with jalap and ginger. Dose.– 0·6 to 1·2 grammes (10 to 20 grains).

This powder was included in the British Pharmacopœia, 1914.

SCAMMONIUM
(Scammonium)

Scammony

Synonym—Virgin Scammony.

Scammony is a gum-resin obtained from the growing root of *Convolvulus Scammonia* Linn. (Fam. Convolvulaceæ). The crown of the root is cut off obliquely, and the emulsion, which exudes from cells in the parenchymatous tissue, is collected in a shell placed at the lower edge of the cut surface. The contents of the shells are collected, made into a cake and allowed to dry.

The drug occurs in large flat, dark grey to blackish pieces, or in irregular, flattened lumps which are easily broken; thin fragments are translucent and yellowish-brown. The fractured surface is glossy, and usually exhibits small cavities, probably the result of fermentation during the slow drying of the drug. The odour is faint but butyric, and the taste is slightly acrid. When triturated with water, it forms a white emulsion. Scammony **contains** resin, about 80 per cent., and gum; only traces of starch are present. The ash varies from about 3 to 6 per cent.

Substitutes.—Owing to the scarcity of genuine scammony, factitious substitutes are sometimes found in commerce; these may generally be detected by the absence of the butyric odour, high ash and sometimes by the presence of foreign starch. The presence of foreign resins may be detected by extracting the drug with ether and dissolving the ether extract in hot solution of potassium hydroxide; on acidifying, resin is not precipitated, although the solution may become opalescent from separation of fatty acids. Skilleep is a variety of scammony consisting of farinaceous dough mixed with some of the gum-resin.

Action and Uses.—The action of scammony resembles that of scammony resin. It is, however, miscible with water or milk, the resin forming an emulsion with the gum present.

Dose.—0·3 to 0·6 gramme (5 to 10 grains).

SCILLA
(Scill.)
Squill

Synonym—Scillæ bulbus I.A.

Squill consists of the bulb of *Urginea Scilla* Steinh. (Fam. Liliaceæ), divested of its outer, membranous scales and dried; it is indigenous to the Mediterranean region. The bulbs are collected in August, deprived of their roots and outer membranous scales, and the remaining fleshy scales are sliced and dried in the sun. Squill should be **stored** in well-closed containers; powdered squill should be kept quite dry in a desiccated atmosphere.

Squill occurs in curved or straight, angular pieces, tapering towards each end, about 0·5 to 5 centimetres long and 3 millimetres thick, of a yellowish-white colour, horny in texture, somewhat translucent, and breaking with an almost glassy fracture when quite dry, but readily absorbing moisture when exposed to the air, becoming tough and flexible. It is almost odourless; the taste is mucilaginous, disagreeably bitter and acrid.

The diagnostic **microscopical** characters are pieces of the epidermis of both surfaces showing only very occasional stomata; portions of the mesophyll, traversed by collateral vascular bundles having spiral and annular vessels, and consisting of thin-walled parenchyma containing occasional starch grains, large cells containing bundles of acicular raphides embedded in mucilage which stains pink with alkaline solution of corallin, individual crystals being up to about 1 millimetre long, and many cells containing dextrose.

A number of glycosides and bitter principles have been prepared from squill and given such names as scillitoxin, scillipicrin, scillin, scillain, scillitin, but none is regarded as a pure substance. Scillaren is a mixture of scillaren A and scillaren B. The former is a pure crystalline glycoside, $C_{37}H_{54}O_{13}$, which gives on hydrolysis scillaridin A, $C_{25}H_{32}O_3$, and a sugar, scillabiose. Scillaren B is a mixture of glycosides. Both

have a high physiological activity. Squill also contains mucilage, sinistrin (a carbohydrate), a phytosterol and calcium oxalate. It yields to alcohol (60 per cent.) about 65 per cent. of extractive.

Substitute.—A red variety of *Urginea Scilla* is used in French pharmacy in addition to the white variety of the British Pharmacopœia; it has a more intensely bitter taste. This red variety is also used for the manufacture of rat poison.

Standard, B.P.—Squill yields not more than 6 per cent. of ash. The British Pharmacopœia does not include a biological assay for squill and no standard is recommended by the Permanent Commission on Biological Standardisation of the League of Nations.

Squill, in powder (Pulvis Scillæ : Pulv. Scill.), contains the constituents and possesses the diagnostic microscopical characters of Scilla, and complies with the limit for ash of the unground drug.

Action and Uses.—Squill resembles digitalis in its action, but its effects on the heart and blood vessels are much more powerful; it increases the force of cardiac systole to a greater extent, and its action on the systemic blood vessels raises blood pressure to an extent which is unobtainable with digitalis. It also constricts the coronary vessels much more strongly than digitalis, and this is no doubt one reason which has rendered its value second to that of digitalis in therapeutics, because it is so essential in cardiac therapeutics to do all that is possible to improve the blood supply of the heart itself. It is given with digitalis in cardiac dropsy, also to promote absorption of effusions in the pleura and other serous cavities. Squill is more irritant than digitalis and not so readily absorbed, and it is for the latter reason that it is less suitable for general use in cardiac disease. In large doses it produces nausea and vomiting, and it was at one time used as an emetic. In smaller doses it mildly irritates the stomach and produces reflex secretion from the bronchioles; it is used mainly as an expectorant in the treatment of cough in chronic bronchitis.

The tincture is **administered** in mixture form with other expectorants, especially ipecacuanha and ammonium carbonate. Vinegar, oxymel and syrup of squill are also common constituents of expectorant cough mixtures. For use as a cardiac tonic in dropsy, squill is frequently given in pill form with mercury pill and digitalis (see Pilulæ Digitalis Compositæ). The powdered drug and extracts made from it have been largely used as rat poisons and are said to be very efficacious, the red variety being preferred for this purpose although there is not sufficient evidence of its superiority.

Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

Preparations

Acetum Scillæ, B.P.—(Acet. Scill.)—Vinegar of Squill. *Syn.*—Acetum Scillæ I.A. It contains active constituents equivalent to approximately 10 per cent. w/v of squill. Specific gravity, 1·031 to 1·035; it complies also with a test for limits for acidity. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Extractum Scillæ Liquidum, B.P.C.—(Ext. Scill. Liq.)—Liquid Extract of Squill. 1 in 1. Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

Linctus Diamorphinæ et Scillæ, B.P.C.—(Linct. Diamorph. et Scill.)—Linctus of Diamorphine and Squill. Each fluid drachm contains $\frac{1}{400}$ grain of diamorphine hydrochloride and $\frac{1}{50}$ grain of sodium antimonyltartrate, with liquid extracts of senega and squill, glycerin and syrup. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Linctus Scillæ, B.P.C.—(Linct. Scill.)—Linctus of Squill. *Syn.*—Linctus; Simple Linctus. Oxymel of squill, 1 in 4, with mucilage of tragacanth, glycerin, emulsion of chloroform and syrup. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Linctus Scillæ Compositus, B.P.C.—(Linct. Scill. Co.)—Compound Linctus of Squill. *Syn.*—Linctus Scillæ Opiatus; Opiate Linctus of Squill; Gee's Linctus. Equal parts of camphorated tincture of opium, oxymel of squill and syrup of tolu. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Oxymel Scillæ, B.P.—(Oxymel Scill.)—Oxymel of Squill. It contains active constituents equivalent to approximately 5 per cent. w/v of squill, with acetic acid, distilled water and purified honey. Specific gravity, about 1·27. Optical rotation at 20° of a 25 per cent. w/v solution in water, decolourised if necessary with charcoal, +0·6° to −1·9°. It complies also with a test for limits of acidity. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Oxymel Scillæ I.A. contains approximately the same proportion of squill and acetic acid, but a smaller proportion of honey.

Pilulæ Digitalis Compositæ, B.P.C.—(Pil. Digit. Co.)—Compound Digitalis Pills. *Syn.*—Pilulæ Digitalis cum Scilla; Guy's Pills; Niemeyer's Pills. Each pill contains 1 grain each of powdered digitalis, squill, and pill of mercury. Dose.– 1 or 2 pills.

Pilulæ Ipecacuanhæ cum Scilla, B.P.C.—(Pil. Ipecac. c. Scill.)—Ipecacuanha Pills with Squill. Each pill contains 2 grains of powder of ipecacuanha and opium and ⅔ grain each of squill and ammoniacum. Dose.– 1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914, under the name of Pilula Ipecacuanhæ cum Scilla.

Pilulæ Scillæ Compositæ, B.P.C.—(Pil. Scill. Co.)—Compound Squill Pills. Each pill contains 1 grain of squill, about ¾ grain each of ginger and ammoniacum and about ½ grain of hard soap. Dose.– 1 or 2 pills.

The mass with which these pills are made was included in the British Pharmacopœia, 1914.

Syrupus Scillæ, B.P.—(Syr. Scill.)—Syrup of Squill. Vinegar of squill, 45 per cent. v/v, with sucrose and distilled water; it contains active constituents approximately equivalent to 4·5 per cent. w/v of squill. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tinctura Scillæ, B.P.—(Tinct. Scill.)—Tincture of Squill. *Syn.*—Tinctura Scillæ I.A. It is prepared by maceration with alcohol (60 per cent.), and contains active constituents equivalent to approximately 10 per cent. w/v of squill. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

SCOPARIUM

(Scopar.)

Scoparium

Synonyms—Broom Tops; Scoparii Cacumina.

Scoparium consists of the fresh or dried tops of *Cytisus scoparius* Link (Fam. Leguminosæ), a shrub indigenous to the British Isles and temperate Europe.

The stem is dark green, with long, erect, straight, slender, alternate branches which are from about 1 to 3 millimetres in diameter. The branches are tough, flexible and glabrous, and have five, winged, longitudinal ridges; they bear small, sessile, simple leaves near the tips and trifoliate, stalked leaves below. In the dry drug few leaves are present. The taste is bitter and unpleasant. The fresh drug, especially when bruised, has a characteristic odour which disappears on drying.

Scoparium **contains** the liquid, volatile alkaloid, sparteine, together with a small quantity of a crystalline, volatile alkaloid, genisteine, and a non-volatile alkaloid, sarothamnine. It also contains a yellow, crystalline substance, scoparin, belonging to the flavone group. It yields to alcohol (20 per cent.) about 16 per cent. of extractive. The ash is about 3 per cent.

Standard.—Scoparium contains not more than 5 per cent. of stem measuring more than 4 millimetres in diameter and not more than 2 per cent. of foreign organic matter.

Action and Uses.—Scoparium is employed as a mild diuretic, generally in dropsical complaints of cardiac origin. This action is due to the sparteine, although, like digitalis, it has little diuretic effect in normal health. It is **administered** in the form of decoction, infusion, or juice, often with squill and ammonium or potassium acetate. Infusion of scoparium is frequently used as a vehicle for the administration of other diuretics.

Preparations

Decoctum Scoparii, B.P.C.—(Dec. Scopar.)—Decoction of Scoparium. *Syn.*—Decoction of Broom. 1 in 20. When decoction of scoparium or Decoctum Scoparii is prescribed, either Decoctum Scoparii or Decoctum Scoparii Concentratum suitably diluted may be dispensed. Dose.– 60 to 120 millilitres (2 to 4 fluid ounces).

Decoctum Scoparii Concentratum, B.P.C.—(Dec. Scopar. Conc.)—Concentrated Decoction of Scoparium. *Syn.*—Concentrated Decoction of Broom. 1 in 2½. One part added to seven parts of distilled water yields a preparation which is approximately equivalent in strength to decoction of scoparium, but contains about 3 per cent. v/v of alcohol (90 per cent.). Dose.– 8 to 16 millilitres (2 to 4 fluid drachms).

Infusum Scoparii Concentratum, B.P.C.—(Inf. Scopar. Conc.)—Concentrated Infusion of Scoparium. *Syn.*—Concentrated Infusion of Broom. 1 in 1¼. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of scoparium, and differs also in containing a small proportion of alcohol. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Infusum Scoparii Recens, B.P.C.—(Inf. Scopar. Rec.)—Fresh Infusion of Scoparium. *Syn.*—Fresh Infusion of Broom. 1 in 10. When infusion of scoparium or Infusum Scoparii is prescribed, fresh infusion not being specified, either Infusum Scoparii Recens or Infusum Scoparii Concentratum suitably diluted may be dispensed. Dose.– 30 to 60 millilitres (1 to 2 fluid ounces).

This infusion was included in the British Pharmacopœia, 1914 under the name of Infusum Scoparii.

Mistura Potassii Acetatis Composita, B.P.C.—(Mist. Pot. Acet. Co.)— Compound Potassium Acetate Mixture. *Syn.*—Mistura Diuretica. Each fluid ounce contains 20 grains of potassium acetate, 30 minims of spirit of nitrous ether, 20 minims of tincture of hyoscyamus and 1 fluid drachm of juice of scoparium, with infusion of buchu. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Succus Scoparii, B.P.C.—(Succ. Scopar.)—Juice of Scoparium. *Syn.*—Juice of Broom. The juice expressed from fresh scoparium, mixed with one-third its volume of alcohol (90 per cent.). Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

This juice was included in the British Pharmacopœia, 1914.

SCOPOLIA
(Scopolia)
Scopolia

Synonym—Scopola.

Scopolia is the dried rhizome of *Scopolia carniolica* Jacq. (Fam. Solanaceæ), a plant common in the region of the Carpathian mountains, especially in Roumania and Czecho-Slovakia.

The rhizome occurs in entire or longitudinally split pieces from about 2·5 to 10 centimetres long and 8 to 20 millimetres thick. The external surface is yellowish-brown to dark brownish-grey, finely and irregularly wrinkled longitudinally, obscurely annulate, more or less warty, and bears closely set, cup-shaped stem-scars on the upper surface. The fracture is short and sharp, and the smoothed, transverse section exhibits a narrow, brown cork, a yellowish bark about 1 millimetre thick, an indistinctly radiate wood and a horny central pith. It is odourless, and the taste is sweetish at first but afterwards bitterish and acrid.

Scopolia **contains** the alkaloid, hyoscyamine; it also contains hyoscine and probably atropine, the total alkaloid varying from about 0·4 to 0·5 per cent.

Action and Uses.—Scopolia resembles belladonna in its properties and may be employed for similar purposes, but the drug itself is rarely used in medicine.

Dose.– 0·06 to 0·12 gramme (1 to 2 grains).

SCUTELLARIA
(Scutellar.)
Scutellaria

Synonyms—Scullcap; Madweed.

Scutellaria consists of the dried tops of *Scutellaria galericulata* Linn. and *S. lateriflora* Linn. (Fam. Labiatæ), perennial herbs, the

former indigenous to the British Isles and Europe and the latter to the United States of America.

The dried tops are about 50 centimetres long with smooth, branched, quadrangular stems and opposite, petiolate or nearly sessile, ovate-lanceolate or ovate-oblong leaves about 5 centimetres long and with a serrate margin. The flowers are blue, about 6 millimetres long, in axillary, one-sided racemes. The calyx is bilabiate, closed in front, and the upper lip helmet-shaped. The taste is somewhat bitter, and the odour is slight.

Scutellaria **contains** a bitter, crystalline glycoside, scutellarin, and a small quantity of volatile oil.

Substitute.—*Scutellaria integrifolia* Linn. (Western scullcap) is distinguished by its bitter taste, pubescent leaves and its inflorescence, which is a terminal raceme.

Standard.—Scutellaria contains not more than 2 per cent. of foreign organic matter.

Action and Uses.—Scutellaria is very rarely prescribed, but it has been used in neuralgia, hiccough, insomnia and nervous disorders. It is **administered** in the form of dry or liquid extract (1 in 1).

Dose.– 1 to 2 grammes ($\frac{1}{4}$ to $\frac{1}{2}$ drachm).

SENEGA
(Seneg.)
Senega

Synonyms—Senega Radix; Senega Root.

Senega is the dried root of *Polygala Senega* Linn. (Fam. Polygalaceæ), a perennial, herbaceous plant indigenous to Southern Canada and the United States of America.

Senega has a knotty root-stock, up to about 4 centimetres wide, consisting of the remains of slender, aerial stems, buds, and purplish, scaly leaves, from which descends the tap-root, usually about 5 to 20 centimetres long. The latter bears one or more spreading, lateral roots and is usually tortuous, with rather angular bends, on the concave side of which may be seen a distinct keel following a slightly spiral course, sometimes for some distance, whilst the convex side is usually transversely wrinkled, especially in the upper region of the root. The fracture is short and splintery in the wood and smooth in the bark. The smoothed, transverse surface shows a thin layer of cork, a light brown bark and a central, whitish wood traversed by almost imperceptible medullary rays. Anomalous secondary thickening occurs, resulting in increased development of phloem in the region of the keel, where this is present, and the formation in the xylem of one or sometimes two wedges of parenchyma with their apices adjacent to the primary xylem. The odour is characteristic, recalling that of wintergreen, and

the taste is at first sweetish, but afterwards acrid. The powder is very irritating to the mucous membranes of the nose and throat, and the drug imparts to water the property of frothing.

The diagnostic **microscopical** characters are the parenchyma, containing oil but not starch; the xylem consisting of numerous, pitted tracheids and fewer pitted or reticulated, small vessels; the absence of sclerenchymatous fibres and cells, and calcium oxalate crystals.

Senega **contains** two glycosidal saponins, senegin and polygalic acid, which resemble, but are not identical with, quillaiasapotoxin and quillaic acid. Polygalic acid is sternutatory and produces frothing, while senegin is decidedly toxic. It also contains about 5 per cent. of fixed oil. The ash is about 5 per cent. Senega yields to alcohol (20 per cent.), about 28 per cent. of extractive.

Varieties.—Western senega is a smaller variety with a crown about 1 to 1·5 centimetres wide; northern senega is ascribed to *Polygala Senega* var. *latifolia* Torr. and Gray, and consists of larger roots, but resembles the western variety in other respects.

Substitute.—White senega, or southern senega, is the root of *Polygala alba* Nutt.; it is smaller and more slender than western senega; it has a normal wood but no keel. The taste is much less acrid.

Standard, B.P.—Senega contains not more than 5 per cent. of stems and other foreign organic matter.

Senega, in powder (Pulvis Senegæ : Pulv. Seneg.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—The action of senega is attributed to its saponin constituents, which are irritant to the gastric mucous membrane and give rise to a reflex secretion of mucus in the bronchioles. It is not absorbed into the system. Senega is employed, usually with other expectorants such as ipecacuanha, squill and ammonium carbonate, in chronic bronchitis. It is **administered** as infusion, liquid extract, or tincture.

Dose.– 0·4 to 0·8 gramme (6 to 12 grains).

COCILLANA.—Cocillana, or Guapi bark, is the dried bark of *Guarea Rusbyi* Rusby (Fam. Meliaceæ), a tree indigenous to Bolivia. The bark occurs in flat or curved pieces, varying in length and width, and up to about 2 centimetres in thickness. The fissured outer surface is greyish-brown in colour, or orange-brown where the cork has been removed, and is often covered with greyish lichens. Internally, the bark is of a brown colour and is coarsely striated longitudinally. The drug has a characteristic odour and a somewhat astringent and nauseous taste. Cocillana contains an alkaloid, resin (about 2·5 per cent.), fixed oil (about 2·5 per cent.) and a crystalline hydrocarbon. The drug resembles ipecacuanha in its action and has been administered in the form of a liquid extract (1 in 1) as an expectorant. Dose.– 0·5 to 1 gramme (8 to 15 grains).

Preparations

Extractum Senegæ Liquidum, B.P.—(Ext. Seneg. Liq.)—Liquid Extract of Senega. 1 in 1. It is prepared with alcohol (60 per cent.), and made slightly alkaline with dilute solution of ammonia. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Infusum Senegæ Concentratum, B.P.—(Inf. Seneg. Conc.)—Concentrated Infusion of Senega. Senega, 1 in 2½, extracted with alcohol (25 per cent.). The product is made faintly alkaline with dilute solution of ammonia. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of senega, and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

A concentrated infusion, prepared with dilute chloroform water and alcohol (90 per cent.) and containing also oil of sweet birch, was included in the British Pharmaceutical Codex, 1923.

Infusum Senegæ Recens, B.P.—(Inf. Seneg. Rec.)—Fresh Infusion of Senega. Senega, 1 in 20. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Tinctura Senegæ, B.P.—(Tinct. Seneg.)—Tincture of Senega. Liquid extract of senega, 20 per cent. v/v, in alcohol (60 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SENNÆ FOLIUM

(Senn. Fol.)

Senna Leaf

Senna leaf consists of the dried leaflets of the paripinnate leaves of *Cassia acutifolia* Delile, known in commerce as Alexandrian senna, and of *C. angustifolia* Vahl, known in commerce as Tinnevelly senna (Fam. Leguminosæ), the former indigenous to and to some extent cultivated in the regions of the middle and upper Nile, the latter cultivated in India.

The leaflets are lanceolate to ovate-lanceolate, about 2 to 5 centimetres long and 0·5 to 1·6 centimetres wide, pale greyish-green or yellowish-green in colour, thin and brittle in texture, unequal at the base, and covered with a very short, fine pubescence, visible under a lens. The margin is entire and slightly incurled, the apex acute and mucronate, and the base very shortly stalked. The veins are more distinct on the under surface. The odour is slight, and the taste mucilaginous, slightly bitter and characteristic.

The diagnostic **microscopical** characters are the epidermises of both surfaces, composed of straight-walled, polygonal cells with rubiaceous stomata and conical, unicellular, thick-walled, warty trichomes which are frequently curved near the base; the presence of mucilage, filling the inner half of many of the epidermal cells; the isobilateral mesophyll, with palisade cells in a single layer on each surface and having wavy radial walls on the lower surface; above and below the veins, groups of pericyclic fibres flanked externally by a sheath of cells each containing a single prism of calcium oxalate; the cluster-crystals of calcium oxalate found in some cells of the interneural mesophyll.

Senna leaf **contains** rhein, aloe-emodin, kæmpferol and *iso*rhamnetin, all four substances occurring both free and in the form of glycosides; myricyl alcohol, salicylic acid and a phytosterolin are also present. The drug contains in addition mucilage, calcium oxalate, resin and amorphous

glycosidic material. Senna leaf yields to cold water about 30 to 40 per cent. of extractive.

Varieties.—Alexandrian senna leaflets are pale greyish-green and ovate-lanceolate; they are usually slightly curved and twisted, and are brittle and often broken; the vein islet number is 25 to 30. Tinnevelly senna leaflets are yellowish-green and lanceolate, flat, mostly unbroken and usually rather larger than the Alexandrian variety; the vein islet number is 20 to 23. They are less pubescent than Alexandrian senna, and are marked by occasional oblique and transverse lines produced by the hydraulic pressure used in packing the bales.

Substitutes.—Leaflets of *C. obovata* Collad., known as "dog senna," are distinguished by their obovate shape and, microscopically, by the papillose cells of the lower epidermis. Leaflets of *C. montana* Hayne, which are darker in colour, have a rounded apex and a dark network of veins. Leaflets of *C. angustifolia*, growing wild in Arabia, known as Arabian or Mecca senna, are narrow, lanceolate and usually discoloured. Palthé senna, from *C. auriculata* Linn., consists of small oblong to obovate leaflets, which are coloured crimson by 80 per cent. v/v sulphuric acid. Leaflets of *C. holosericea* Fresen. are small and hairy. Argel leaves, derived from *Solenostemma Argel* Hayne (Fam. Apocynaceæ), have been found admixed with Alexandrian senna, and occasionally the dehisced follicles and plumed seeds are also present; the texture of the leaves is thick and rigid. They are peculiarly curled, curved, or twisted; the surface is finely wrinkled, and the veins are not evident. The leaf is equal at the base, the hairs are three-celled, and the taste is distinctly bitter.

Standard, B.P.—Senna leaf contains not more than 1 per cent. of stalks and not more than 2 per cent. of other foreign organic matter. Ash, not more than 12 per cent. Acid-insoluble ash, not more than 3 per cent.

Senna leaf, in powder (Pulvis Sennæ Folii : Pulv. Senn. Fol.), contains the constituents and possesses the diagnostic microscopical characters of Sennæ Folium, and complies with the limits for ash and acid-insoluble ash of the unground drug.

Action and Uses.—Senna leaf has an action similar to that of the fruit, but the latter is considered to be less griping. It is free from after-astringent action, but, on account of its tendency to gripe, is usually given with carminatives. It is a suitable laxative for the use of children and delicate persons and, in the form of Confectio Sennæ, is especially valuable in hæmorrhoids. Senna leaf may be **administered** as an infusion (1 in 10) in doses of 15 to 60 millilitres (½ to 2 fluid ounces).

Dose.– 0·6 to 2 grammes (10 to 30 grains).

Preparations

Confectio Sennæ, B.P.—(Conf. Senn.)—Confection of Senna. Senna leaf, about 10 per cent., with coriander, fig, tamarind, cassia, prune, extract of liquorice, sucrose and distilled water. Dose.– 4 to 8 grammes (1 to 2 drachms).

Confectio Sennæ et Sulphuris, B.P.C.—(Conf. Senn. et Sulphur.)—Confection of Senna and Sulphur. Confection of senna and confection of sulphur, equal parts. Dose.– 4 to 8 grammes (1 to 2 drachms).

Tinctura Sennæ Composita, B.P.C.—(Tinct. Senn. Co.)—Compound Tincture of Senna. Senna leaf, 1 in 5, caraway and coriander, of each, 1 in 40. Dose.– For repeated administration, 2 to 4 millilitres (½ to 1 fluid drachm); for a single administration, 8 to 16 millilitres (2 to 4 fluid drachms).

This tincture was included in the British Pharmacopœia, 1914.

SENNÆ FRUCTUS

(Senn. Fruct.)

Senna Fruit

Synonym—Senna Pod.

Senna fruit consists of the dried, ripe fruits of *Cassia acutifolia* Delile, known in commerce as Alexandrian senna pods, and of *C. angustifolia* Vahl, known in commerce as Tinnevelly senna pods, (Fam. Leguminosæ); the former plant is indigenous to and cultivated in the regions of the middle and upper Nile, the latter cultivated largely in India.

Alexandrian senna pods are pale green to greenish-brown, with a brown central zone where the positions of the seeds are indicated by slight swellings; they are flattened laterally, rounded-oblong to feebly reniform in shape and of a parchment-like texture. The apex is rounded, with a slightly projecting point which is the base of the style; the base is cuspidate, sometimes shortly stalked, and the length of the pod varies from 3 to 6 centimetres and the width from 2 to 2·5 centimetres. Each pod contains about 5 to 7 flat, obovate-cuneate, hard seeds about 5 to 6 millimetres long, having a wrinkled, whitish-green surface and a short, raised ridge on each side at the pointed end. Tinnevelly senna pods are usually darker, slightly narrower (not more than 2 centimetres wide) and somewhat straighter than the Alexandrian, and the remains of the base of the style are usually more pronounced. The average weight of a single senna pod is about 0·16 gramme (2½ grains). Senna fruit appears to **contain** the same active constituents as the leaf. It yields to cold water about 18 to 30 per cent. of extractive.

Standard, B.P.—Senna fruit contains not more than 2 per cent. of foreign organic matter.

Action and Uses.—Senna fruit is an efficient purgative either for occasional use or in habitual constipation. Its action is exerted on the large intestine. Like other members of this group it should be given with care during pregnancy. It is free from the after-astringent action of rhubarb, but, on account of its tendency to gripe, it is usually combined with carminatives and other laxatives. Preparations made from the fruit, without bruising the seed, are said to be less griping than those prepared from senna leaf. It is usually **administered** in the form of infusion or syrup, either of which is a suitable laxative for children and delicate persons. Mistura Sennæ Composita is a brisk purgative. The urine of patients taking senna preparations may be turned a yellow colour which changes to red on the addition of an alkali.

Dose.– 0·6 to 2 grammes (10 to 30 grains), or 4 to 12 pods.

Preparations

Elixir Sennæ, B.P.C.—(Elix. Senn.)—Elixir of Senna. *Syn.*—Liquor Sennæ Leguminorum Dulcis; Sweet Essence of Senna Pods. Liquid extract of senna, 1 in 2, with sucrose, chloroform, oil of coriander, tincture of capsicum, alcohol (90 per cent.) and distilled water. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Extractum Sennæ Liquidum, B.P.—(Ext. Senn. Liq.)—Liquid Extract of Senna. 1 in 1. It is prepared with chloroform water, concentration being effected under reduced pressure at a temperature not exceeding 60°, and preserved with one-quarter of its volume of alcohol (90 per cent.). Dose.– 0 6 to 2 millilitres (10 to 30 minims).

A liquid extract prepared with a diluted alcohol was included in the British Pharmaceutical Codex, 1923.

Infusum Sennæ Concentratum, B.P.—(Inf. Senn. Conc.)—Concentrated Infusion of Senna. Senna fruit, 1 in 1¼, extracted with alcohol (20 per cent.), the product being mixed with 8 per cent. v/v of strong tincture of ginger. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of senna, and differs also in containing a small proportion of alcohol. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

A concentrated infusion, prepared with dilute chloroform water and alcohol (90 per cent.), and containing less strong tincture of ginger, was included in the British Pharmaceutical Codex, 1923.

Infusum Sennæ Recens, B.P.—(Inf. Senn. Rec.)—Fresh Infusion of Senna. Senna, 1 in 10, and ginger, 1 in 200. Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

Mistura Sennæ Composita, B.P.—(Mist. Senn. Co.)—Compound Mixture of Senna. *Syn.*—Black Draught. Magnesium sulphate, 25 per cent. w/v, with liquid extract of liquorice, compound tincture of cardamom, aromatic spirit of ammonia and infusion of senna. Dose.– 30 to 60 millilitres (1 to 2 fluid ounces).

Syrupus Ficorum Compositus, B.P.C.—(Syr. Fic. Co.)—Compound Syrup of Figs. *Syn.*—Syrupus Ficorum Aromaticus; Aromatic Syrup of Figs. Compound tincture of rhubarb, 1 in 20, liquid extract of senna, 1 in 10, and elixir of cascara sagrada, 1 in 20, in syrup of figs. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Syrupus Sennæ, B.P.—(Syr. Senn.)—Syrup of Senna. Liquid extract of senna, 25 per cent. v/v, with oil of coriander, sucrose and distilled water. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

SERIPARIUM

(Seripar.)

Rennet

Synonym—Rennin.

Rennet is the partially purified milk-curdling enzyme obtained from the glandular layer of the fourth or true digesting stomach of the calf. The stomachs are freed from superfluous matter such as outer skin, useless membrane and fat, washed, treated with salt and dried. The dried stomachs are comminuted and the rennet is extracted by means of a 5 per cent. solution of sodium chloride. From the solutions thus obtained the rennet may be precipitated by full saturation with sodium chloride, collecting and drying the precipitate. Rennet so obtained contains appreciable quantities of sodium chloride.

Rennet occurs as a greyish-white or yellowish-white powder, or as pale yellow grains or scales, having a characteristic and slightly saline taste. It is slightly hygroscopic. It is slowly soluble in water and in diluted alcohol, the solutions being more or less opalescent. When mounted in water or diluted alcohol and examined microscopically, it shows no cellular structure and produces no blue colouration on the addition of iodine solution. Rennet deteriorates rapidly, and must be kept in well-stoppered, amber-coloured bottles, and **stored** in a cool place. Rennet heated for ten minutes at 38° at *p*H 7·25 loses approximately only half its clotting power, whereas that of pepsin under similar conditions is almost completely destroyed.

Standard.—Rennet coagulates not less than 25,000 times its weight of fresh cows' milk when tested by the following method:—Mix 0·1 gramme of rennet with 50 millilitres of distilled water by gently stirring or triturating, and allow the liquid to stand for exactly fifteen minutes. Place 50 millilitres of milk, having an acidity to phenolphthalein equivalent to not less than 0·14 and not more than 0·15 per cent. of lactic acid, in a beaker about 12 centimetres high and 5 centimetres in diameter. Warm the milk rapidly on a water-bath to 43°, add 1 millilitre of the rennet solution and stir the mixture slowly for ten seconds. Maintain the temperature at 43° until the milk begins to thicken, as shown by a distinctly convex surface when the beaker is tipped to an angle of about 45°. The thickening must take place within ten minutes from the time of the addition of the rennet solution. An additional thirty seconds on the water-bath produces a firm curd.

Action and Uses.—Rennet is not used in medicine; it is employed in culinary operations to prepare easily digestible milk curds and in the manufacture of cheese. On the addition of rennet to milk, at a temperature of 38°, coagulation occurs. The coagulum consists of casein and the fat of the milk is associated with it. The whey contains lactalbumen, lactose and the salts of milk (chiefly calcium phosphate). Coagulation of milk involves two processes, (a) the conversion of caseinogen into paracasein and (b) the precipitation of the paracasein by the calcium salts contained in the milk. Hence milk in which the effective calcium content has been diminished either by dilution, boiling, the addition of sodium citrate or alkali, or dialysis, either does not coagulate or gives a small, flocculent clot on the addition of rennet. The rennin enzymes are ubiquitous. In fact, a rennin enzyme is present wherever proteolytic enzymes have been identified. For this reason it is now generally assumed that the coagulation of milk by gastric rennin is due to the action of pepsin and that the coagulation of milk by pancreatic rennin is due to the action of trypsin. It may be observed, however, that in order that pancreatic rennin (trypsin) may coagulate milk the calcium content of the milk must be raised to 4 per cent. by the addition of a soluble calcium salt. For this reason the existence of pancreatic rennin has been denied by many observers. Rennet may be used in the form of tablets.

SERPENTARIA

(Serpent.)

Serpentary

Synonyms—Serpentariæ Rhizoma; Serpentary Rhizome; Red River Snake Root; Texan Snake Root.

Serpentary consists of the dried rhizome and roots of *Aristolochia reticulata* Nutt. (Fam. Aristolochiaceæ), a small herbaceous plant with a perennial rhizome, indigenous to the United States of America and collected mainly in Texas.

The rhizome is about 2 centimetres long and 3 millimetres in thickness with numerous long, curved, but not matted, roots attached. It bears on the upper surface cup-shaped scars and short bases of aerial stems. The fracture is short and the fractured surface shows an eccentric pith situated nearer the upper surface, wide curved medullary rays, and a narrow brown bark. The roots, which are from 8 to 10 centimetres long and about 1·5 millimetres thick, are not shrivelled, and have a short fracture, the fractured surface showing a small, yellow wood and a thick, white bark. The drug is yellowish-brown in colour and has a camphoraceous odour and an acrid, bitter taste.

The diagnostic **microscopical** characters are the thin cork; the parenchymatous cortex containing starch grains from 3 to 15 microns in diameter, either single or compound; the occasional bast fibres; the xylem consisting of vessels up to 40 microns wide and wood fibres; the medullary rays about 4 to 8 cells wide, lignified and containing starch. The cells of the parenchymatous pith are pitted and lignified and contain starch. Calcium oxalate is absent.

Serpentary **contains** volatile oil (about 1 per cent.), tannin and a bitter principle, apparently an alkaloid, which crystallises in light yellow needles. The drug yields to alcohol (60 per cent.) about 14 per cent. of extractive.

Substitute.—Virginian snake root, from *A. Serpentaria* Linn., resembles the Texan variety, but has a shorter and thinner rhizome, and thinner, wiry, interlacing roots forming matted masses.

Standard, B.P.—Serpentary contains not more than 10 per cent. of its sub-aerial stems and not more than 2 per cent. of other foreign organic matter. Ash, not more than 10 per cent.

Serpentary, in powder (Pulvis Serpentariæ : Pulv. Serpent.), contains the constituents and possesses the diagnostic microscopical characters of Serpentaria, and complies with the limit for ash of the unground drug.

Action and Uses.—Serpentary is a bitter which is used to excite the gustatory nerve endings and so, reflexly, to influence gastric secretion, and is employed with mineral acids and other bitters in dyspepsia. The infusion is a useful vehicle for tonic mixtures. Serpentary is used in the preparation of compound tincture of cinchona.

Dose.– 0·05 to 0·1 gramme ($\frac{3}{4}$ to $1\frac{1}{2}$ grains).

INULA.—Elecampane consists of the dried rhizome and roots of *Inula Helenium* Linn. (Fam. Compositæ). The drug consists chiefly of long, slightly tapering roots about 0·5 to 2 centimetres thick, the larger ones having been longitudinally sliced. The roots are light grey in colour, hard and horny. The fracture is short and the smoothed, transverse surface exhibits an indistinctly radiate wood separated from the cortex by a darker cambium line. In both wood and cortex large, scattered, dark brown, shining oil glands are visible. The rhizome is usually in thin, irregularly rounded slices 4 to 5 centimetres in diameter. The drug has an agreeable, aromatic odour and an aromatic, slightly bitter taste. Elecampane contains a bitter principle and inulin, and on distillation with water the drug yields from 1 to 2 per cent. of a crystalline mass mixed with a little volatile oil. It has been used in the form of decoction (1 in 40) or liquid extract (1 in 1) in the treatment of bronchitis.

Preparations

Infusum Serpentariæ Concentratum, B.P.C.—(Inf. Serpent. Conc.)—Concentrated Infusion of Serpentary. 1 in 2½. When infusion of serpentary or Infusum Serpentariæ is prescribed, this concentrated infusion diluted with seven times its volume of distilled water may be dispensed. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tinctura Serpentariæ, B.P.C.—(Tinct. Serpent.)—Tincture of Serpentary. 1 in 5. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

This tincture was included in the British Pharmacopœia, 1914.

SERUM ANTIBOTULINUM

(Serum Antibotulin.)

Anti-botulinus Serum

Synonym—Botulinus Antitoxin.

Anti-botulinus serum consists of the blood serum of horses which have been rendered immune by repeated injections of the specific bacterial exotoxin obtained from cultures of *Clostridium botulinum* (*Bacillus botulinus*). This micro-organism is an anærobic, spore-forming bacillus, normally found in soil. There are two types of *C. botulinum*, designated A and B, and these produce different toxins. The antitoxin to toxin A has no effect on toxin B, and vice versa. Anti-botulinus serum should be **stored** between 3° and 15°. Under these conditions it will retain its potency for about three months. It should be issued in sterilised **containers** sealed so as to exclude bacteria. If the containers permit the withdrawal of less than the entire contents, the antitoxin should contain a preservative not less potent than 0·5 per cent. of phenol. The label of the container should indicate the date beyond which the antitoxin is not intended to be used.

Action and Uses.—Botulism is a condition of acute toxæmia characterised by paralysis of cranial motor nerves and of the diaphragm. It is due to the botulinus toxin present in the infected food at the time it is consumed. The affinity of this toxin for nervous tissue resembles that of tetanus toxin and is broken with equal difficulty. Botulinus toxin is an extremely powerful poison. The

earliest symptoms of its action are blurred or double vision, giddiness, ptosis, and difficulty in swallowing and in speaking. In most cases of botulism the food responsible is definitely abnormal in appearance and odour, but in occasional cases no evidence of spoilage can be detected. Canned, smoked and pickled foods, which are liable to soil contamination during the process of manufacture, are the main sources of botulism. Anti-botulinus serum has not yet been proved to be effective in the treatment of human cases, but since no other effective treatment is known, it should be given a trial in a case of botulism. No success can be expected from the serum treatment unless it is given in the early stages of the disease. Persons who have consumed suspected food and in whom symptoms have not developed should receive an injection of serum as a prophylactic.

Dose.– Large doses, 30 to 50 millilitres (450 to 750 minims), of the polyvalent serum, or preferably of the monotypical serum if the type intoxication is known, should be given intravenously every day until recovery occurs or the clinical condition is hopeless. For a prophylactic dose, 10 millilitres may be given intramuscularly.

SERUM ANTIDYSENTERICUM (SHIGA)

(Serum Antidysenteric. (Shiga))

Anti-dysentery Serum (Shiga)

Anti-dysentery serum (Shiga) consists of the serum of animals, or a preparation of the serum, containing the immunising substances which have a specific therapeutic value when injected into persons infected with *Bacillus dysenteriæ* (Shiga). The animals are immunised by the injection of cultures or of sterile filtrates from cultures of *B. dysenteriæ* (Shiga). When a satisfactory degree of immunisation has been effected, a quantity of blood is withdrawn, allowed to clot, and the serum collected. It may be used in the liquid form or dried. The globulins containing the specific immunising substances may be separated from the serum by fractional precipitation and the precipitate may be used in solution or dried. Both liquid forms may contain an antiseptic.

The serum occurs as a yellow or yellowish-brown liquid or, in the solid condition, as a yellowish-white powder or yellow or yellowish-brown flakes. The solution of the globulins is of a yellowish-brown or greenish-yellow colour. Both liquid forms are transparent when first made, but become faintly opalescent when stored; they are almost odourless except for any odour due to the added antiseptic. The solution of the globulins does not contain more than 20 per cent. w/v of solid matter and the liquid serum does not contain more than 10 per cent. w/v of solid matter. The dried globulins resemble the dried serum in appearance and 10 per cent. w/v solutions of the dried forms resemble the liquid forms. The solid forms do not contain any added

antiseptic or other substance. In whatever form the product is obtained it should be **stored** in sterilised glass containers sealed so as to exclude bacteria and kept at as low a temperature above its freezing point as possible. The number of units in each container is sufficient to ensure that the number stated on the label is still present at the end of the period during which the preparation is intended to be used. The label on the **container** or the package states the nature of the contents and the date after which it is not intended to be used. The label on the container states the minimum total number of units in the container and also the number of units in one millilitre or in one gramme, or the total number of millilitres of a liquid or grammes of dried product in the container.

Standard, B.P.—All forms of anti-dysentery serum (Shiga) comply with the tests for sterility and with tests for freedom from abnormal toxicity prescribed by the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Bacilli of the dysentery group have been shown to be associated with certain forms of summer diarrhœa of children, and with asylum and institutional dysentery. Anti-dysentery serum possesses valuable prophylactic and curative properties against these conditions; it is of course useless in the treatment of amœbic dysentery. The effect of the treatment is seen in a reduction of the number of the stools, which in successful cases falls to normal in twenty-four hours. The treatment should, however, be continued for two days after this normal condition has been attained. Some cases of ulcerative colitis have been treated with doses of 100 millilitres of anti-dysentery serum intravenously.

Dose.– 4000 to 10,000 units, by injection.

POLYVALENT ANTI-DYSENTERY SERUM, prepared from the serum of horses which have been immunised to more than one strain of the dysentery bacillus, is sometimes used instead of the monovalent serum. Such sera are designated by the names of the strains from which they are prepared, such as Anti-dysentery serum (Shiga-Flexner-Y.) or (Shiga-Flexner-Sonne-Y.).

SERUM ANTIMENINGOCOCCICUM

(Serum Antimeningococcic.)

Anti-meningococcus Serum

Anti-meningococcus serum is the serum obtained from the blood of horses which have been immunised against strains of the meningococcus (*Diplococcus intracellularis meningitidis* Weichselbaum or *Neisseria meningitidis*), isolated from different sources. The meningococcus is a small, gram-negative, intracellular diplococcus which is present in large numbers in the meninges of the brain and spinal cord and in the cerebrospinal fluid of cases of meningococcal meningitis. Four serological types of the meningococcus are known. These are designated by the classification of Gordon, types I, II, III and IV, and the serum

is usually prepared by immunising the horses to all four types. Anti-meningococcus serum as ordinarily prepared is thus a polyvalent serum. According to the classification of Griffith, Group I corresponds to Gordon's types I and III, and Group II corresponds to Gordon's types II and IV. The serum as usually prepared, by immunising the horses to either live or dead cultures of the organism, is antibacterial rather than antitoxic in character, and contains agglutinins, bacteriolysins and anti-endotoxins. It has been shown, however, that, contrary to the previously accepted belief, the meningococcus produces an extracellular toxin and it is possible to prepare a specific antitoxin.

Anti-meningococcus serum is a pale coloured, slightly opalescent liquid with no characteristic odour other than that of the preservative which may be added. Anti-meningococcus serum should be **stored** between 5° and 15° in sterile containers sealed so as to exclude bacteria. The label on the **container** states the date beyond which the serum should not be used and the amount and nature of the preservative.

Standard.—Anti-meningococcus serum complies with the tests for sterility and freedom from abnormal toxicity prescribed in the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Anti-meningococcus serum has proved of much value in the treatment of meningococcal meningitis, and its use should never be neglected in any case of the disease, although good results usually accrue only from its administration in the early stages. It is of no value in meningitis caused by other organisms. In meningococcal meningitis it should be given both intravenously and intrathecally for the first few doses; later the intravenous dose may be omitted. For intrathecal injection, a volume of cerebrospinal fluid larger than the volume of the dose of serum must be drawn off by lumbar puncture and the serum—which should be warmed to the body temperature—immediately injected very slowly. The serum must be injected intrathecally at least once a day for the first five days, no matter what the clinical condition may be. If intrathecal injection is not possible, the serum should be administered intracisternally, the same precautions being observed. The dosage must be regulated according to the age and clinical condition of the patient. Adults will tolerate larger doses than infants, and in acute cases greater risks may be taken than in mild cases. In cases of medium severity the adult dose should be 20 to 30 millilitres given intrathecally once a day, with one or more doses of 20 to 30 millilitres given intravenously during the first one or two days. In severe cases the intrathecal dose should be 20 to 30 millilitres given twice in the first twenty-four hours and thereafter once a day, with two or more doses of 20 to 30 millilitres given intravenously. For infants under one year of age it is not advisable to inject more than 10 millilitres for an intrathecal dose, but the dose may be repeated. The serum may also be employed intramuscularly as a prophylactic treatment for contacts in doses of 15 millilitres.

Dose.– 10 to 30 millilitres by intrathecal or intravenous injection.

SERUM ANTIPESTIS

(Serum Antipest.)

Anti-plague Serum

Anti-plague serum consists of the serum separated from the blood of horses which have been immunised against *Pasteurella pestis* Trevisan, the causal organism of bubonic plague. This micro-organism is a short, plump, gram-negative, bipolar-staining bacillus which is found in enormous numbers in the blood and in the lymphatic glands of plague patients. The immunisation of the horses may be effected by injecting increasing doses of killed cultures of the organism at first subcutaneously, later intravenously, followed by intravenous injection of live cultures. A preservative is added to the serum after separation. Anti-plague serum is a pale coloured, slightly opalescent liquid. The serum should be **stored** at a low temperature but should not be frozen. It may retain its potency for about three months, and the label on the **container** should state the date beyond which the serum should not be used.

Standard.—Anti-plague serum complies with the tests for sterility and freedom from abnormal toxicity prescribed in the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Although several anti-plague sera, differing chiefly in the details of their mode of preparation, are obtainable, in practice no serum has yet proved efficacious, and the English Plague Commission failed to obtain any evidence that serum treatment was beneficial in the treatment of bubonic plague. If it is desired to give serum treatment a trial in the control of an epidemic, large doses should be injected both intravenously and intramuscularly at the earliest possible moment after diagnosis is established. Doses of up to 50 millilitres should be given intravenously and from 10 to 20 millilitres intramuscularly. This dosage should be repeated daily as long as the clinical condition justifies the hope of recovery. The serum may also be employed prophylactically in the case of persons exposed to infection.

Dose.—Therapeutic, up to 50 millilitres, by intravenous injection; prophylactic, 20 millilitres, by intramuscular injection.

SERUM ANTIPNEUMOCOCCICUM

(Serum Antipneumococcic.)

Anti-pneumococcus Serum

Anti-pneumococcus serum is serum, or a preparation of serum, containing the immunising substances which have a specific neutralising effect on pneumococci. It is prepared by separating the serum from the blood of animals which have been immunised by injections of cultures of

Diplococcus pneumoniæ. The serum is used in the liquid form. Four serological types of this micro-organism are recognised; potent anti-pneumococcus serum can be prepared from types I and II only. The globulins containing the specific protective substances may be obtained from the serum by fractional precipitation and are used in solution, the product being known as Felton's anti-pneumococcus serum. It may contain immune substances from type I or type II pneumococcus only or from both types in the same preparation. The final product, whether serum or solution of the globulins, is distributed in sterilised glass containers sealed so as to exclude bacteria.

The liquid serum is yellow or yellowish-brown and the solution of the globulins is yellowish-brown or greenish-yellow. Anti-pneumococcus serum should be **stored** at as low a temperature as possible above the freezing-point. The number of units placed in each container must be sufficient to ensure that the number stated on the label is still present at the end of the period during which the preparation is intended to be used. The label or wrapper on the package or the label on the **container** states (1) whether the product is serum or a solution of the globulins, (2) whether the product contains antibodies for types I and II, or for either type alone, (3) the date after which the preparation is not intended to be used. The label on the container states the total number of units in the container and either the volume of liquid or the number of units per millilitre.

Standard.—Anti-pneumococcus serum complies with the regulations made under the Therapeutic Substances Act, 1925. The assay of anti-pneumococcus serum is conducted by the injection into test animals of a mixture of serum and broth cultures of pneumococci. There is no unit agreed upon for international use, but a unit in general use is defined as that amount of serum which, when injected simultaneously with broth cultures, will protect mice against one million lethal doses of virulent pneumococci. A provisional standard is issued by the Medical Research Council and is based upon the original unit as defined by Felton. The assay of anti-pneumococcus serum may also be conducted by methods based on precipitation by the serum of the specific polysaccharide of the pneumococcus.

Action and Uses.—Anti-pneumococcus serum is antibacterial rather than antitoxic in character. It acts directly on the pneumococcus rendering it susceptible to phagocytosis, and it neutralises a specific toxic carbohydrate associated with the capsule of the organism. It is used in the treatment of pneumococcal pneumonia due to either type I or type II of the organism and should be administered as soon as a diagnosis has been made. The type of the organism should, if possible, be ascertained. Results are more favourable in infections due to type I than in those due to type II.

The serum should always be given intravenously; the initial dose should be 10,000 or 20,000 units repeated at intervals of not less than six hours up to a total of 40,000 to 80,000 units in twenty-four hours, with subsequent doses, if necessary, on the second day. The intervals can be

extended to twelve hours if treatment is begun during the first three days. The effects of early serum treatment in cases of primary pneumonia are shown by a rapid fall in temperature and the progressive disappearance of all signs of toxæmia. The disappearance of cyanosis is a particularly marked feature after the first or second dose. The physical signs indicating the course of the inflammatory processes undergo a rapid change, corresponding with the effect of the serum in relieving symptoms. The viscid, blood-stained, rusty sputum, typical of early pneumonia, changes to a loose, purulent expectoration. A preliminary test for sensitivity is desirable to prevent anaphylactic reactions and, in the case of a positive reaction, desensitisation should be attempted by the intravenous injection of a small dose of serum, or adrenaline hydrochloride solution (3 to 8 minims) may be injected before the serum is administered. It is used also in primary pneumococcal meningitis and primary pneumococcal peritonitis.

Dose.– 10,000 or 20,000 units, by injection.

SERUM ANTISTREPTOCOCCICUM

(Serum Antistreptococcic.)

Anti-streptococcus Serum

Anti-streptococcus serum consists of the blood serum of horses which have been immunised against a large number of strains of streptococci isolated from a variety of streptococcal infections, such as erysipelas, endocarditis, puerperal fever and acute otitis media. The serum so obtained is a polyvalent, antibacterial serum with very little antitoxic power. A serum that is antitoxic as well as antibacterial may be prepared by immunising the horses against the toxins of the micro-organisms as well as against the cultures themselves. The antitoxic and antibacterial substances may be separated by fractional precipitation and used in solution. It contains 0·5 per cent. of phenol or other suitable antiseptic.

Standard.—Anti-streptococcus serum complies with the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Anti-streptococcus serum is used for the treatment of streptococcal infections such as general septicæmia, infective endocarditis, wound infections, etc. It is also used in scarlet fever, erysipelas and puerperal septicæmia, but in these diseases serum prepared from the specific strain of streptococcus is generally preferred. Early administration and adequate dosage of the serum are necessary; the possibility that the patient may have been sensitised by a previous dose of horse serum should be borne in mind and in cases of sensitisation the procedure described under Serum Anti-pneumococcicum should be followed. The action of anti-streptococcus serum is erratic; sometimes it may exert little or no beneficial effect,

but occasionally its early administration results in a prompt and dramatic recovery. This possibly occurs when the strain of streptococcus responsible for the particular infection under treatment is identical with one of the strains employed in the manufacture of the serum. In acute and septicæmic cases the serum should be given intravenously in doses of 10 to 30 millilitres, repeated daily if necessary. In subacute cases 10 to 20 millilitres should be injected intramuscularly.

Dose.– 10 to 30 millilitres (150 to 450 minims), by intravenous or intramuscular injection.

SERUM ANTIVENENOSUM

(Serum Antivenenos.)

Anti-venom Serum

Synonyms—Antivenene; Snake Venom Antitoxin.

Anti-venom serum consists of the blood serum of horses which have been immunised by subcutaneous injections of snake venom. The poisonous snakes belong chiefly to the Colubrine and the Viperine families. To the former belong the cobras, the coralline snakes, the kraits, the hamadryad and the death-adder. To the latter belong the common viper, the puff-adder, the rattlesnake, bush-master and the copperhead. The poisonous water-snakes are classed as Colubrine snakes. In recent years much evidence has been brought forward to show that a serum prepared from a colubrine venom will not neutralise a viperine venom, and vice versa. Moreover, there appears to be a high degree of generic specificity among the snake venoms, so that, for example, a serum prepared for use against cobra venom will not completely neutralise the venom of the death-adder. Theoretically it should be possible to prepare a polyvalent anti-venom, but in practice this is not possible because of the extreme toxicity of mixed venoms. Of the numerous anti-venom sera available that prepared by Calmette's method from a mixture of 80 per cent. cobra poison with 20 per cent. viperine venom is probably the most efficient for general use.

Standard.—Anti-venom serum complies with the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—A monovalent anti-venom serum undoubtedly does exert both a curative and a protective action, but, as most patients are unable to identify the snake that has bitten them (most snake bites occur during the night or in the dusk of the evening), a monovalent anti-venom serum can only rarely be used. Moreover there is much conflict of opinion upon the relative values of the different monovalent anti-venom sera that are available. The principal poisonous substances in snake poison are hæmolytic, hæmorrhagic, leucolytic and neurotoxic, and there is some evidence that the proportions of

these toxic bodies may vary among different members of the same genus. In addition to the immediate use of a suitable anti-venom serum vigorous local treatment should always be undertaken. A ligature should be applied above the bite when the site permits; the wound should be opened up and thoroughly syringed with a solution of chlorinated lime or dressed with powdered potassium permanganate, ether and ammonia being given by the mouth and strychnine subcutaneously. The serum, to be of any real value, must be injected almost immediately after the bite. Anti-venom serum loses its strength on keeping, especially in the tropics. Anti-scorpion serum is uscless against viperine venom.

Dose.– At least 100 millilitres, and more if possible, by intravenous injection.

ANTI-ADDER SERUM.—The only poisonous snake indigenous to England is the adder, *Viperus berus*. The normal dose of anti-adder serum is 10 millilitres or more intravenously.

SERUM NORMALE

(Serum Normal.)

Normal Serum

Synonym—Normal Horse Serum.

Normal serum is blood, free from corpuscles and fibrin. It is obtained from the blood of horses which are known to be free from glanders and tuberculosis and are in good condition. The blood is withdrawn usually from the jugular vein, under strict aseptic precautions, and is allowed to clot. As soon as the serum separates it is collected and a small quantity of a preservative, such as cresol, 0·4 per cent., or phenol, 0·5 per cent., is added. The serum is tested to determine the absence of hæmolytic or toxic properties; it is examined bacteriologically for sterility and is afterwards passed through Berkefeld filters before filling into sterile containers which are sealed so as to exclude bacteria. Normal serum contains serum-globulins, serum-albumins and fibrin ferment, together with the natural chemical substances of the blood serum.

Normal serum is a pale yellowish, slightly opalescent liquid, having no odour other than that of any antiseptic which may have been added. Normal serum should be **stored** below 15°, but should not be frozen. The label on the **container** states the date beyond which the serum must not be used and the nature and amount of preservative added.

Standard.—Normal serum complies with the tests for sterility and freedom from abnormal toxicity prescribed in the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Normal serum is administered in the treatment of hæmorrhage, in hæmophilia, in purpura, and in gastric and duodenal

ulcerations accompanied by hæmorrhage. The hæmostatic action of normal serum is attributed to the fibrin ferment present. In the treatment of hæmorrhage it is best administered by subcutaneous or intramuscular injection. In other conditions, such as anæmia, it may be given orally. In persons who are hypersensitive to the proteins of horse serum, the injection of normal serum may be followed by more or less pronounced symptoms of anaphylactic shock. These symptoms are also likely to occur in persons who have received serum treatment at some previous time. They may range from an urticarial skin eruption and œdema with joint pains to the more severe symptoms shown by rapid pulse, fall in temperature, dyspnœa, etc. These symptoms may appear from a few hours up to two weeks or so after the injection, but usually between the eighth and fourteenth days. In some cases, notably in asthmatic subjects, the symptoms may appear very rapidly and terminate fatally. Calcium chloride, calcium lactate, atropine and adrenaline may be used for the control of anaphylactic symptoms. Sensitivity to normal serum may be detected by an intradermal test and, if present, desensitisation by small doses (1 minim gradually increased), given at intervals of two hours, should be performed.

Dose.– 10 to 20 millilitres (150 to 300 minims).

SEVUM
(Sev.)
Suet

Synonyms—Sevum Præparatum; Prepared Suet.

Suet is the internal fat of the abdomen of the sheep. It is prepared by cutting the fresh omentum into pieces, crushing the pieces so as to break the membranous vesicles in which the fat is enclosed, then melting and straining, the fat being stirred continuously while cooling to prevent the separation of constituents of high melting-point in a granular form. It occurs as a firm, white, almost odourless, fat, unctuous to the touch and having a bland taste. On prolonged exposure to the air, suet becomes rancid and then must not be used. Suet contains the glycerides of stearic and palmitic acids, about 70 to 80 per cent., together with about 20 to 30 per cent. of the glyceride of oleic acid. Tallow is the internal fat of various ruminant animals, particularly the ox and sheep. When pure it is white and almost odourless but usually it is yellowish and has a disagreeable odour. Tallow contains a number of mixed glycerides and is used in the manufacture of soap and candles.

Soluble in boiling alcohol (90 per cent.) (1 in 45) and ether (about 1 in 60); insoluble in water and cold alcohol (90 per cent.).

Standard, B.P.—Suet has a melting-point of 45° to 50°. Refractive index at 60°, 1·449 to 1·451. Acid value, not more than 2·0. Saponification value, 192 to 195. Iodine value, 33 to 46.

Uses.—Suet is used in the preparation of mercury ointment and as a solvent for phosphorus and salicylic acid. In India, suet should be used instead of lard in making the official preparations.

Preparations

Sevum Benzoinatum, B.P.C.—(Sev. Benz.)—Benzoinated Suet. Suet containing the fat soluble matter of 3 per cent. of benzoin.

This preparation was included in the British Pharmacopœia, 1914, under the name of Sevum Benzoatum.

Sevum Phosphoratum, B.P.C.—(Sev. Phosphor.)—Phosphorated Suet. Phosphorus, 10 per cent., in suet. Dose.– 0·006 to 0·03 gramme ($\frac{1}{10}$ to $\frac{1}{2}$ grain).

SIMARUBA

(Simarub.)

Simaruba

Synonyms—Simarubæ Cortex; Simaruba Bark.

Simaruba consists of the dried root-bark of *Simaruba amara* Aubl. (Fam. Simarubaceæ), a tall tree indigenous to tropical America.

The bark occurs in long, very fibrous pieces, about 10 centimetres wide and 8 millimetres thick, more or less fissured and torn longitudinally; the outer surface is buff in colour, rough and deprived of its cork; the inner surface is yellowish-brown in colour, fibrous and longitudinally striated. The smoothed, transverse section shows numerous narrow medullary rays traversing the entire thickness of the bark. The freshly broken surface of the bark gives a characteristic yellowish-green fluorescence in ultra-violet light. The drug is without odour and has a bitter taste.

The diagnostic **microscopical** characters are the occasional pieces of thin-walled cork; the yellow, thick-walled, stone cells occurring singly and in ovoid groups in both cortex and phloem; the phloem fibres in groups of 5 to 20 and having moderately thickened, lignified walls; the prisms of calcium oxalate in many of the cells abutting upon the groups of stone cells and fibres; the presence of only a very few ovoid starch grains up to 16 microns in diameter.

Simaruba **contains** a crystalline bitter principle, a tasteless, crystalline substance, fixed oil, traces of a fluorescent body, and a yellow resin.

Substitutes, one of which is described as Maracaibo simaruba, are occasionally met with, and some of them are free from bitterness.

Action and Uses.—Simaruba has been used as a bitter, and as an astringent in chronic dysentery. It may be **administered** as a decoction (1 in 20).

Dose.– 1 to 2 grammes ($\frac{1}{4}$ to $\frac{1}{2}$ drachm).

SINAPIS NIGRA
(Sinap. Nig.)
Black Mustard

Black mustard consists of the seeds of *Brassica nigra* Koch. (Fam. Cruciferæ), a plant largely cultivated in temperate climates.

The seeds are dark purplish-brown, nearly spherical, with a minutely pitted surface, and are about one millimetre in diameter. Internally, they are yellowish and oily, the section exhibiting two folded cotyledons embracing a small radicle. The taste is at first bitter, but rapidly becomes pungent. The dried seeds have little odour, but on triturating with water a pungent odour is developed.

The diagnostic **microscopical** characters are the large, thin-walled, epidermal cells containing mucilage; the single layer of small, polygonal, beaker-shaped, sclerenchymatous cells, varying in height as seen in sectional view from 3 to 10 microns and bearing a polygonal network (meshes 60 to 100 microns across) as seen in surface view; the dark brown pigment layer attached to the sclerenchymatous cells; the polygonal cells of the cotyledons and hypocotyl-radicle with thin cellulose walls, filled with fixed oil and small, rounded aleurone grains containing globoids but devoid of crystalloids.

Black mustard **contains** the glycoside, sinigrin, and the enzyme, myrosin. These interact in the presence of water to yield allyl *iso*thiocyanate of which the drug yields from 0·6 to 1 per cent. It also contains proteins, mucilage and about 27 per cent. of fixed oil.

Uses.—Black mustard is used in the preparation of the volatile and fixed oils and, with white mustard, in the preparation of bath mustard, mustard bran and mustard flour.

SINAPIS ALBA.—White mustard is obtained from *Sinapis alba* Linn. (Fam. Cruciferæ), cultivated in temperate countries. The seeds are yellowish in colour, nearly spherical in shape, and the surface is minutely pitted; they measure about 2 millimetres in diameter. The seeds have a pungent taste, but no odour, even when triturated with water. The microscopical characters resemble those of black mustard, excepting that the hypodermis is formed of collenchyma, and the sclerenchymatous beaker-cells are yellowish, of fairly uniform height and unaccompanied by a dark pigment layer. White mustard contains the crystalline glycoside, sinalbin, myrosin, fixed oil, mucilage and proteins. White mustard, with black mustard, is used for the expression of the fixed oil, and in the preparation of bath mustard, mustard bran and mustard flour.

BATH MUSTARD is similar in colour to mustard flour, but is in coarser powder; when examined microscopically, a slightly larger proportion of seed coats is found. Mustard baths for the feet are used for sleeplessness and in incipient colds, and a mustard sitz-bath is employed in amenorrhœa (1 tablespoonful to each gallon of water). Bath mustard should not be mixed with boiling water, or the pungent, volatile oil will be developed only to a limited extent owing to the destructive action of excessive heat on the myrosin.

MUSTARD BRAN is a coarse, brown powder with no distinct odour even when triturated with water; it has a slightly bitter but not pungent taste. It consists usually of the seed coats of black mustard.

MUSTARD FLOUR consists of the powdered seeds of black and white mustard, freed to a large extent from the seed coats. It is a yellowish-green, oily powder,

with a somewhat bitter and pungent taste and faintly oily odour, which becomes pungent when the powder is triturated with water. Cereal and scitaminaceous starches should be absent, and the powder should give no reaction for the colouring matter of turmeric. Mustard flour increases the flow of saliva and gastric juice. It is used as a condiment, and as an emetic in cases of poisoning (1 tablespoonful mixed in a tumblerful of hot water). It causes redness and a feeling of warmth when applied to the skin or mucous membrane; if the action be prolonged, vesication is produced. It is employed externally as a counter-irritant either in the form of poultice or as mustard paper (Charta Sinapis). Mustard paper is used as a counter-irritant in lumbago, congestion of the lung, pneumonia, bronchitis, phthisis and wherever counter-irritation is indicated. Small pieces of suitable size and shape may be applied to the temple or behind the ear, and fixed in position by a strip of adhesive plaster. Mustard paper should be dipped in tepid water for about fifteen seconds before being applied. "Half-strength" mustard papers are prepared, or one or two layers of damped muslin may be placed next to the skin, if the full-strength papers cause too much pain and irritation.

SODII ACETAS

(Sod. Acet.)

Sodium Acetate

$C_2H_3O_2Na,3H_2O = 136{\cdot}1$

Sodium acetate, $CH_3{\cdot}COONa,3H_2O$, may be prepared by neutralising acetic acid with sodium carbonate or hydroxide and crystallising the resulting solution. It occurs in the form of odourless, colourless, translucent, monoclinic prisms or as a white, granular, crystalline powder having a cooling, saline, slightly bitter taste. It is efflorescent in warm air. The aqueous solution has an alkaline reaction. On heating, the salt first liquefies, then becomes anhydrous at 123°; at a higher temperature it is decomposed, giving off inflammable vapours having an empyreumatic odour and leaving a residue of sodium carbonate.

Soluble in water (1 in 1) and alcohol (1 in 30).

Standard.—Sodium acetate, determined by the method of the British Pharmacopœia for Potassii Acetas, contains not less than 99·5 per cent. and not more than the equivalent of 105 per cent. of $C_2H_3O_2Na,3H_2O$; each millilitre of N/2 sulphuric acid is equivalent to 0·06803 gramme of $C_2H_3O_2Na,3H_2O$. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. 0·5 gramme complies with the limit test for chlorides. 0·5 gramme complies with the limit test for sulphates. It complies with the limit tests for alkalinity, and aluminium and calcium in Potassii Acetas.

Action and Uses.—Sodium acetate is given as a diuretic and is used in place of sodium bicarbonate as a rectal injection in the treatment of uræmia. It is excreted as carbonate in the urine, which it renders less acid.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

SODII AMINARSONAS

(Sod. Aminarson.)

Sodium Aminarsonate

$C_6H_7O_3NAsNa = 239{\cdot}0$

Sodium aminarsonate, or sodium *p*-aminophenylarsonate, may be prepared by heating aniline with arsenic acid and converting the arsonic acid formed into its sodium salt. The product contains a variable proportion of water, depending on the method employed for crystallisation; it usually contains from 3 to 4 molecules of water, which is not lost by drying at 110°. It occurs as a white, crystalline, odourless powder, having a slightly saline taste. Solutions of the salt reduce potassium permanganate and gold chloride; ferrous sulphate solution gives an olive-green precipitate, bromine solution a white precipitate, and sodium hypobromite solution a bluish-red colour (distinction from other arsenical compounds).

Soluble in water (1 in 5) and alcohol (about 1 in 125).

Standard.—Sodium aminarsonate contains not less than 24 per cent. and not more than 25·6 per cent. of As.

Assay.—Heat 0·2 gramme, accurately weighed, with 5·5 millilitres of sulphuric acid and 1 millilitre of fuming nitric acid for 1 hour; cool slightly, add 15 drops of fuming nitric acid and heat for a further five minutes; add cautiously 1 gramme of ammonium sulphate and when nitrogen ceases to be evolved, cool and dilute with water to about 70 millilitres. Add 1 gramme of potassium iodide and concentrate the solution to about 40 millilitres by boiling, add just sufficient N/100 sodium thiosulphate to decolourise the solution, dilute to 100 to 120 millilitres, add 50 millilitres of 4N sodium carbonate, neutralise by the addition of a slight excess of sodium bicarbonate and titrate with N/10 iodine using starch mucilage as indicator; each millilitre of N/10 iodine is equivalent to 0·003747 gramme of As.

Action and Uses.—Sodium aminarsonate is the prototype of the organic arsenical compounds. The arsenic compounds are inactive in the pentavalent form, their therapeutic activity being dependent upon conversion to the trivalent form when injected into the body. Sodium aminarsonate, which is stated to have one-fortieth the toxicity of arsenic, has been employed for the treatment of trypanosomiasis, syphilis, malaria and pernicious anæmia. For sleeping sickness, a warm 20 per cent. w/v solution has been recommended to be injected hypodermically, at first in small daily doses, gradually increasing to 1 millilitre (15 minims). This strength may, however, cause inflammation at the site of injection and a 10 per cent. w/v solution is preferable. After a week's treatment, injections of 1 millilitre (15 minims) of a 1 per cent. w/v solution of mercuric chloride are given on four successive days in place of the arsenical injections. Sodium aminarsonate is also used in association with some aniline dyes that exert a specific action upon

trypanosomes, such as trypan blue and trypan red, but owing to its relatively feeble trypanocidal action, together with the risk of causing optic atrophy, it has now largely yielded place to tryparsone. In cases where the cerebrospinal fluid is involved, the drug is of no value. In the treatment of syphilis, large doses, up to 0·6 gramme (10 grains), of this salt have been given by intramuscular injection, but they are sometimes followed by toxic symptoms; several cases of optic atrophy following this intensive treatment have led to its practical abandonment. Sodium aminarsonate is used for chronic skin diseases, similarly to sodium cacodylate and disodium methylarsonate, small doses only being employed orally. Most of the sodium aminarsonate injected is rapidly excreted unchanged in the urine. Solutions for **injection** may be sterilised by tyndallisation or by filtration. It is **incompatible** with acids, alkalis and salts of mercury and other heavy metals.

Dose.– 0·05 to 0·2 gramme ($\frac{3}{4}$ to 3 grains).

SODII ARSENAS ANHYDROSUS

(Sod. Arsen. Anhydros.)

Anhydrous Sodium Arsenate

$Na_2HAsO_4 = 185·9$

Synonyms—Sodium Arseniate; Disodium Hydrogen Arsenate.

Anhydrous sodium arsenate may be obtained by heating the crystalline salt at a temperature of 150° until it ceases to lose moisture. It occurs in the form of an odourless, granular, amorphous, white powder. The aqueous solution has an alkaline reaction, due to partial hydrolysis. The dried salt is hygroscopic; it should be **stored** in well-closed containers.

Soluble in water (1 in 6); slightly soluble in alcohol (90 per cent.).

Standard.—Anhydrous sodium arsenate contains not less than 99·5 per cent. of Na_2HAsO_4, calculated on the substance dried at 150°. Loss on drying at 150°, not more than 2 per cent. 1 gramme complies with the limit test for chlorides. 0·5 gramme complies with the limit test for sulphates.

Assay.—Dissolve about 0·25 gramme, accurately weighed, in 25 millilitres of water, add 3 grammes of potassium iodide and 25 millilitres of hydrochloric acid, and titrate the liberated iodine with N/10 sodium thiosulphate, using starch mucilage as indicator; each millilitre of N/10 sodium thiosulphate is equivalent to 0·009297 gramme of Na_2HAsO_4.

Action and Uses.—Sodium arsenate has a mild arsenical action. It is employed in chronic skin diseases, in some forms of anæmia and in parasitic diseases of the blood, such as trypanosomiasis in man or animals. It is given in mixtures as Liquor Sodii Arsenatis, or in pills.

For hypodermic use, a solution containing 0·5 per cent. w/v of anhydrous sodium arsenate may be employed in doses of 1 millilitre (15 minims). Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·0015 to 0·006 gramme ($\frac{1}{40}$ to $\frac{1}{10}$ grain).

ACIDUM ARSENICUM.—Arsenic acid, $H_3AsO_4,\frac{1}{2}H_2O$, occurs in colourless, deliquescent crystals or as a granular powder. Melting-point, about 100°; at 110° it becomes anhydrous; at a higher temperature it loses oxygen and water, and arsenic trioxide is formed and volatilised. It is very soluble in water, alcohol and glycerin. Arsenic acid is usually given as iron or sodium arsenate. It is rarely given in the free state, but may be administered in the form of an aqueous solution. The arsenic compounds produce the same effects as arsenous compounds, but they act more slowly and are less poisonous. Dose.– 0·001 to 0·005 gramme ($\frac{1}{60}$ to $\frac{1}{12}$ grain).

PLUMBI ARSENAS.—Lead arsenate occurs as a white powder, insoluble in water but soluble in acid. It is used in the form of a paste, containing about 50 per cent. of lead arsenate, for horticultural purposes. It should be used with caution, and should not be applied to fruits and green vegetables on account of its highly poisonous properties, and should always be coloured before sale as a precautionary measure.

SODII ARSENAS.—Sodium arsenate, $Na_2HAsO_4,7H_2O$, may be obtained by fusing together a mixture of arsenic trioxide, sodium nitrate and sodium carbonate until evolution of gas ceases; the fused mass is then treated with water and subsequently crystallised. This crystalline salt is the sodium arsenate of the International Agreement (Natrii arsenas I.A.), which contains the equivalent of 36·85 per cent. of arsenic pentoxide.

Preparation

Liquor Sodii Arsenatis, B.P.C.—(Liq. Sod. Arsen.)—Solution of Sodium Arsenate. It contains from 0·95 to 1·05 per cent. w/v of anhydrous sodium arsenate. 0·5 millilitre contains 0·005 gramme, and 8 minims contains about $\frac{1}{12}$ grain, of anhydrous sodium arsenate. Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

This solution was included in the British Pharmacopœia, 1914.

SODII BENZOAS

(Sod. Benz.)

Sodium Benzoate

$C_7H_5O_2Na = 144·0$

Sodium benzoate, $C_6H_5{\cdot}COONa$, may be obtained by neutralising benzoic acid with sodium carbonate solution and crystallising. Two varieties are available, prepared respectively from natural and from synthetic benzoic acid. Sodium benzoate occurs as a white, amorphous, granular or crystalline powder, having an unpleasant, sweetish, saline taste. The compound prepared from synthetic benzoic acid is odourless while that from natural benzoic acid has a faint odour of benzoin. On the addition of a dilute mineral acid to the aqueous solution, a

precipitate of benzoic acid is produced. With ferric chloride solution a buff-coloured precipitate is obtained.

Soluble in water (1 in 2), and alcohol (90 per cent.) (1 in about 50).

Standard, B.P.—Sodium benzoate contains not less than 99 per cent. of $C_7H_5O_2Na$, calculated on the substance dried at 110°. Loss on drying at 110°, not more than 4 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. Melting-point of the separated benzoic acid, 121° to 122°. It complies also with limit tests for acidity or alkalinity, chlorinated compounds, chloride and sulphate.

Action and Uses.—Sodium benzoate has the action of benzoic acid, but is less irritating and is sometimes preferred on account of its ready solubility in water. It is sometimes employed as an expectorant, but is used principally as a urinary antiseptic, often in combination with hexamine, but is less useful than sodium acid phosphate for this purpose. It is converted by the kidneys into hippuric acid and is excreted as such. Sodium benzoate is best **administered** in solution. It is incompatible with acids and ferric salts. Solutions for **injection** may be sterilised by filtration.

Dose.– 0·3 to 2 grammes (5 to 30 grains).

POTASSII BENZOAS.—Potassium benzoate, $C_6H_5{\cdot}COOK,3H_2O$, occurs as small, efflorescent laminæ or as a white, crystalline powder. It is soluble in water (1 in 1·5) and alcohol (1 in 18). Potassium benzoate has the properties of benzoic acid, and has been employed in cystitis, gout and rheumatism. It is best administered in solution. Dose.– 0·3 to 2 grammes (5 to 30 grains).

SODII BICARBONAS

(Sod. Bicarb.)

Sodium Bicarbonate

$NaHCO_3 = 84{\cdot}00$

Sodium bicarbonate, or sodium hydrogen carbonate, is usually obtained by passing carbon dioxide into brine saturated with ammonia, when sodium bicarbonate is precipitated and ammonium chloride remains in solution. It occurs as a white, odourless, minutely crystalline powder or in small, opaque, monoclinic crystals, having a saline taste and a feebly alkaline reaction. The aqueous solution slowly decomposes at ordinary temperatures with partial conversion into the normal carbonate; the decomposition is accelerated by agitation or by warming the solution. The dry substance is also decomposed when heated, and at 250° to 300° is converted into anhydrous sodium carbonate.

Soluble in water (1 in 11); insoluble in alcohol (90 per cent.).

Standard, B.P.—Sodium bicarbonate contains not less than 99 per cent. and not more than the equivalent of 101 per cent. of $NaHCO_3$. Arsenic limit, 2 parts per million. Lead limit, 5 parts per million. It

complies also with a test for the absence of ammonium compounds, and with limit tests for aluminium, calcium and insoluble matter, alkalinity, chloride, sulphate and iron.

Action and Uses.—Sodium bicarbonate and similar alkaline compounds cause an initial reduction of secretion in the stomach, but this is followed by an increased secretion stimulated by the carbon dioxide liberated. It is used in the treatment of hyperchlorhydria with pain and distension, but the hydroxides of bismuth and magnesium are preferable. When taken for some time alkalis diminish the flow of pancreatic juice owing to a less acid chyme passing into the duodenum, with a consequent reduction in the amount of pancreatic secretion formed. After absorption, the alkali carbonates increase the alkalinity of the tissues and there is an increased excretion of urine, which is rendered less acid. The carbonates are largely employed in medicine with the object of retaining uric acid in solution in the urinary passages; they are of no value for dissolving uric acid already precipitated, but they form a means of preventing further precipitation. Alkalis are of the greatest value in all cases of acidosis, as in the recurrent vomiting of children, the toxæmia of pregnancy, phosphorus and arsenic poisoning and the acidosis of delayed chloroform poisoning. In such cases it is given in large doses with the addition of dextrose. Alkalis are also useful for their effect on the bronchial mucous membrane in bronchial catarrh and bronchitis, rendering the secretion less tenacious. Large doses are given in scarlet fever to prevent the onset of nephritis, and in acute nephritis quantities of sodium bicarbonate may be administered to keep the urine alkaline. Sodium bicarbonate is given twenty to thirty minutes after a meal to relieve the pain and eructation of hyperacidity. In order to inhibit excessive secretion in the stomach and to stimulate the appetite, it is given with bitters, such as gentian, thirty minutes before a meal. It is of great value in dyspepsia and in the bilious vomiting of children. For this purpose sodium bicarbonate in excess may be given with citric acid, in effervescence; for neutralisation, 20 parts of sodium bicarbonate require 16·7 parts of citric acid or 17·8 parts of tartaric acid.

Sodium bicarbonate is used to overcome excessive acidity of the urine and in the treatment of *Bacillus coli* infections of the urinary tract, and also in cases of jaundice and gall bladder infections. In the later stages of diabetes and in diabetic coma good results have followed the administration of large doses, but the benefit is only temporary. A 5 per cent. w/v solution in normal saline is administered intravenously in diabetic coma. In post-partum eclampsia, a 3 per cent. w/v solution is similarly administered. For its action in dissolving mucus, sodium bicarbonate is added to spray solutions and washes for the throat and nose. A weak solution (1 in 150) is applied to the skin to relieve the irritation of urticaria and eczema. A 2 per cent. w/v solution in water is used as an eye lotion. Sodium bicarbonate is best **administered** in dilute aqueous solution. Lozenges and tablets are prepared for use as an antacid in dyspepsia and flatulence. Solutions

for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. When the solution is sterilised by heating in an autoclave or by tyndallisation, the containers must be air-tight and the solution must almost completely fill the container. The containers should not be opened for one or two hours after the temperature of the solution has fallen to normal.

Dose.– 1 to 4 grammes ($\frac{1}{4}$ to 1 drachm).

Preparations

Balneum Effervescens, B.P.C.—(Baln. Efferv.)—Effervescent Bath. Each bath (30 gallons) contains 16 ounces of sodium bicarbonate and 8 ounces of sodium acid sulphate.

Balneum Effervescens cum Chlorido, B.P.C.—(Baln. Efferv. c. Chlorid.)—Effervescent Bath with Chloride. Each bath (30 gallons) contains 16 ounces of sodium bicarbonate, 8 ounces of sodium acid sulphate, 48 ounces of sodium chloride and 8 ounces of calcium chloride.

Liquor Alkalinus, B.P.C.—(Liq. Alk.)—Alkaline Solution. *Syn.*—Collunarium Alkalinum; Alkaline Nasal Wash. Sodium bicarbonate and borax, of each 1·5 per cent. w/v, with phenol and sucrose in distilled water.

Mistura Gentianæ Alkalina, B.P.C.—(Mist. Gent. Alk.)—Alkaline Gentian Mixture. *Syn.*—Mistura Gentianæ cum Soda. Each fluid ounce contains 15 grains of sodium bicarbonate and 5 grains of ammonium carbonate, with syrup of orange and compound infusion of gentian. Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

Mistura Sodii Bicarbonatis Aromatica, B.P.C.—(Mist. Sod. Bicarb. Aromat.)—Aromatic Sodium Bicarbonate Mixture. *Syn.*—Mistura Carminativa. Carminative Mixture. Each fluid ounce contains 10 grains of sodium bicarbonate, with aromatic spirit of ammonia, compound tincture of cardamom, glycerin and dill water. Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

Nebula Alkalina Composita, B.P.C.—(Neb. Alk. Co.)—Compound Alkaline Spray. Sodium bicarbonate and borax, of each 1·5 per cent. w/v, and phenol, 0·75 per cent. w/v, in glycerin and distilled water.

Pulvis Boracis Compositus, B.P.C.—(Pulv. Borac. Co.)—Compound Borax Powder. *Syn.*—Pulvis Alkalinus Compositus; Compound Alkaline Powder. Sodium bicarbonate, sodium chloride and borax, equal parts.

Sodii Citro-Tartras Effervescens, B.P.C.—(Sod. Citro-Tart. Efferv.)—Effervescent Sodium Citro-Tartrate. An effervescent preparation containing sodium bicarbonate and citric and tartaric acids. Dose.– 4 to 8 grammes (1 to 2 drachms).

Effervescent sodium citro-tartrate was included in the British Pharmacopœia, 1914.

Tabellæ Bismuthi et Sodii Bicarbonatis, B.P.C.—(Tab. Bism. et Sod. Bicarb.)—Bismuth and Sodium Bicarbonate Tablets. Each tablet contains 2 grains of bismuth carbonate and 3 grains of sodium bicarbonate. Dose.– 1 to 3 tablets.

Tabellæ Sodii Bicarbonatis Compositæ, B.P.C.—(Tab. Sod. Bicarb. Co.)—Compound Tablets of Sodium Bicarbonate. *Syn.*—Soda Mint Tablets. Each tablet contains 5 grains of sodium bicarbonate, with ammonium bicarbonate, saccharin and $\frac{1}{2}$ minim of oil of peppermint. Dose.– 1 to 4 tablets.

Tabellæ Zingiberis Compositæ, B.P.C.—(Tab. Zingib. Co.)—Compound Tablets of Ginger. *Syn.*—Ginger Mint Tablets. Each tablet contains 5 grains of sodium bicarbonate and $\frac{1}{10}$ grain of oleoresin of ginger, with ammonium bicarbonate, saccharin and $\frac{1}{2}$ minim of oil of peppermint. Dose.– 1 or 2 tablets.

SODII BROMIDUM

(Sod. Brom.)

Sodium Bromide

NaBr = 102·9

Sodium bromide may be obtained by the methods described under potassium bromide using the corresponding sodium compounds in place of the potassium compounds. In order to obtain the anhydrous salt the solution is crystallised at a temperature above 50°. It occurs as odourless, transparent or opaque, colourless crystals or as a white, granular powder, somewhat deliquescent, and having a slightly bitter, saline taste. It does not appear moist until over 20 per cent. of water has been absorbed, owing to the formation of $NaBr,2H_2O$. It should be **stored** in well-closed containers.

Soluble in water (1 in 1·5) and alcohol (90 per cent.) (1 in 16).

Standard, B.P.—Sodium bromide contains not less than 99 per cent. of NaBr, calculated on the substance dried at 110°. Loss on drying at 110°, not more than 5 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for alkali, bromate, barium, chloride, sulphate and iron.

Action and Uses.—Sodium bromide has properties which closely resemble those of potassium bromide, but it is erroneously considered to be less depressing to the heart and less irritating to the stomach. It is employed in large doses in the treatment of the morphine and cocaine habits and in acute mania. In the treatment of epilepsy, sodium bromide has been recommended to be given with food in place of table salt so that the bromide may to some extent take the place of chloride in the tissues and exercise its specific effects on the nerve cells. The bromide treatment of epilepsy is, however, only palliative and some authorities consider it a matter for doubt whether prolonged intoxication with bromides is not a greater evil than an increased frequency of fits. A mixture of potassium, sodium and ammonium bromides is considered to have a better action than that obtained by one of these salts alone. To prevent the formation of the skin rash which often accompanies the bromide treatment, Liquor Arsenicalis is sometimes given concurrently. For cholecystographic purposes, 100 millilitres of a 10 per cent. w/v solution of sodium bromide is administered orally, and X-ray plates exposed at intervals from five to twelve hours afterwards. Sodium bromide is also used in pyelography to show the functional efficiency of the urinary tract; for this investigation, 7 to 10 millilitres of a 20 per cent. w/v solution of the bromide is injected by means of catheters into each ureter. Sodium bromide is usually **administered** in solution; if prescribed in powders, they should be wrapped in tin-foil and enclosed in a bottle. It is **incompatible** with salts of mercury and silver, oxidising substances and with spirit of nitrous ether.

Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·3 to 2 grammes (5 to 30 grains).

Preparation

Mistura Bromidi Composita, B.P.C.—(Mist. Brom. Co.)—Compound Mixture of Bromides. Each fluid ounce contains 10 grains each of the bromides of ammonium, potassium and sodium, with tincture of nux vomica, solution of carmine, glycerin and chloroform water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

SODII CACODYLAS

(Sod. Cacodyl.)

Sodium Cacodylate

$C_2H_6O_2AsNa,3H_2O = 214·0$

Synonym—Sodium Dimethylarsonate.

Sodium cacodylate, $As(CH_3)_2O_2Na,3H_2O$, may be prepared by neutralising cacodylic acid with sodium carbonate, evaporating and crystallising. It occurs as white, odourless, prismatic crystals or as a white, granular powder, and is very deliquescent. It burns with a bluish flame, with the production of a garlic-like odour. It melts at about 60° and becomes anhydrous at 120°. A solution of the salt is alkaline to litmus and is not affected by silver nitrate solution, cobalt nitrate solution, or calcium chloride solution, but produces a white precipitate, turning yellow, with mercuric nitrate solution. A few drops of an aqueous solution (1 in 1000) allowed to stand in a stoppered tube with 2 millilitres of hypophosphorous acid develops the garlic-like odour of cacodyl within an hour. It should be **stored** in well-closed containers.

Soluble in water (2 in 1) and alcohol (1 in 1).

Standard.—Sodium cacodylate, determined by the method for Sodii Aminarsonas, contains not less than 72 per cent. and not more than 75 per cent. of $C_2H_6O_2AsNa$; each millilitre of N/10 iodine is equivalent to 0·007999 gramme of $C_2H_6O_2AsNa$. 1 gramme complies with the limit test for chlorides. 0·5 gramme complies with the limit test for sulphates. 2 grammes dissolved in 50 millilitres of water requires not more than 0·5 millilitre of N/10 sulphuric acid or more than 1·0 millilitre of N/10 sodium hydroxide to neutralise the solution, using phenolphthalein as indicator. 0·5 gramme dissolved in 10 millilitres of water is not rendered turbid, either in the cold or on heating, by calcium chloride solution (limit of disodium methylarsonate). 0·5 gramme in 10 millilitres of water is not rendered turbid within one hour on the addition of magnesium ammonio-sulphate solution (limit of arsenate and phosphate).

Action and Uses.—Sodium cacodylate owes any action it possesses to the small number of arsenic ions set free by the decomposition of the salt; its toxicity is quite disproportionate to the amount of arsenic in the molecule since it is absorbed and excreted mainly as cacodylate, which is itself an inert substance. It has been used in cases where arsenic is employed, especially in chronic skin affections, anæmias, malignant and tuberculous diseases, syphilis, etc. Sodium cacodylate in daily intravenous doses, commencing with 0·06 gramme (1 grain), is sometimes given in endocarditis. It may be **administered** in solution with aromatic elixir, or in pills prepared by triturating the salt with lactose and massing with glycerin of tragacanth. Given by the mouth in these forms, it communicates an alliaceous odour to the breath, a disadvantage which is reduced by the use of hypodermic injections. For the latter purpose a solution may be prepared containing 0·045 gramme ($\frac{3}{4}$ grain) in 1 millilitre (15 minims). More dilute solutions are employed for intravenous and rectal injection in phthisis. As much as 0·2 gramme (3 grains) is sometimes given for a dose. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. Sodium cacodylate is given intramuscularly in conjunction with sodium nucleate as a leucocyte stimulant in septicæmia.

Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

ACIDUM CACODYLICUM.—Cacodylic acid, or dimethylarsonic acid, $(CH_3)_2AsO{\cdot}OH$, occurs in colourless crystals which are hygroscopic and odourless when pure. Melting-point, about 200°. The addition of hypophosphorous acid produces the characteristic odour of cacodylic oxide. It is neutral to methyl orange and acid to phenolphthalein. It is soluble in water (2 in 1) and alcohol (1 in 3·5). Cacodylic acid is rarely administered in a free state; it is usually prescribed as iron or sodium cacodylate. The salts of cacodylic acid are very much less toxic than the corresponding arsenites and arsenates. Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

DISODII METHYLARSONAS.—Disodium methylarsonate, or sodium methylarsinite, $AsO(CH_3)(ONa)_2, 6H_2O$, is a white, crystalline powder. Its aqueous solution is alkaline to litmus and gives white precipitates with silver nitrate, lead acetate and mercuric nitrate solutions, a violet precipitate with cobalt nitrate, and a white precipitate on warming with calcium chloride solution. It is soluble in about 1 part of water and slightly soluble in alcohol. Dose.– 0·03 to 0·12 gramme ($\frac{1}{2}$ to 2 grains).

FERRI CACODYLAS.—Iron cacodylate $[(CH_3)_2AsO_2]_3Fe$, occurs as a yellowish, amorphous powder, soluble in water (1 in 15), but almost insoluble in alcohol. Iron cacodylate has been recommended in chlorosis and other anæmias, and in such skin diseases as lichen, acne and lupus. It is administered in pill form, generally in doses of 0·016 to 0·03 grammes ($\frac{1}{4}$ to $\frac{1}{2}$ grain) three times daily, and by hypodermic injection, daily doses of 0·05 gramme ($\frac{3}{4}$ grain) in distilled water being injected deeply into the gluteal region. Solutions for injection may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. They should be stored protected from light.

QUININÆ CACODYLAS.—Quinine cacodylate, $C_{20}H_{24}O_2N_2,(CH_3)_2AsO{\cdot}OH$, occurs in the form of acicular crystals or as a white powder. It is very soluble in water, and freely soluble in alcohol. Quinine cacodylate is given, with the cacodylates of iron and sodium, in pill form or in solution. Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

STRYCHNINÆ CACODYLAS.—Strychnine cacodylate, $C_{21}H_{22}N_2O_2,(CH_3)_2AsO{\cdot}OH$, occurs as a white, crystalline powder, slightly soluble in water, readily

soluble in chloroform. Strychnine cacodylate has chiefly the action of strychnine, and to a slight extent that of cacodylic acid. It is usually administered hypodermically or intramuscularly, often in combination with iron cacodylate and sodium glycerophosphate under the name of "ferruginous compound." Dose.– 0·002 to 0·006 gramme ($\frac{1}{30}$ to $\frac{1}{10}$ grain).

SODII CARBONAS

(Sod. Carb.)

Sodium Carbonate

$Na_2CO_3,10H_2O = 286·15$

Sodium carbonate is obtained mainly by heating dry sodium bicarbonate and allowing an aqueous solution of the product to crystallise. It may also be prepared by passing carbon dioxide into a solution of sodium hydroxide obtained by electrolysing brine. It occurs as transparent, colourless, odourless, rhombic crystals, with a strongly alkaline taste. The aqueous solution is alkaline to litmus. On exposure to air the crystals effloresce, the completely effloresced salt consisting of a mixture of the decahydrate and monohydrate equivalent to sodium carbonate containing about five molecules of water of crystallisation. When heated to about 50° the crystals fuse, and above 80° they lose the whole of their water of crystallisation, the loss in weight amounting to about 63 per cent. Monohydrated sodium carbonate, Na_2CO_3,H_2O, known in commerce as "crystal soda," is obtained by evaporating sodium carbonate solution at the boiling-point; it is not efflorescent and is largely used as a water softener and bath salt.

Soluble in water (1 in 2); insoluble in alcohol (90 per cent.).

Standard, B.P.—Sodium carbonate contains not less than 99 per cent. and not more than the equivalent of 102 per cent. of $Na_2CO_3,10H_2O$. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for aluminium, calcium and insoluble matter, chloride, sulphate, and iron.

Action and Uses.—Sodium carbonate is employed in the preparation of alkaline baths for use in scaly skin diseases, and an aqueous solution (0·5 per cent.) is used as a lotion, applied with a compress, to relieve irritation in eczema. The carbonate is also used to prepare "bath salts," the crystals often being coloured and perfumed for this purpose. To prevent the rusting of surgical instruments during sterilisation by boiling, 1 per cent. w/v of sodium carbonate may be added to the water in the steriliser.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

SODII SESQUICARBONAS.—Sodium sesquicarbonate, $Na_2CO_3,NaHCO_3,2H_2O$, may be prepared from sodium bicarbonate. It occurs in the form of silky crystals or as a white powder and is sometimes used in the preparation of bath salts.

SODII CARBONAS EXSICCATUS

(Sod. Carb. Exsic.)

Exsiccated Sodium Carbonate

$Na_2CO_3 = 106{\cdot}0$

Synonym—Anhydrous Sodium Carbonate.

Exsiccated sodium carbonate is nearly anhydrous sodium carbonate and may be obtained by heating any of the hydrated forms or by heating sodium bicarbonate. It occurs as a white, odourless powder, with a strongly alkaline taste. On exposure to the air it absorbs moisture and should be **stored** in well-closed containers,

Readily **soluble** in water.

Standard, B.P.—Exsiccated sodium carbonate contains not less than 99·5 per cent. of Na_2CO_3, calculated on the substance dried at 110°. Loss on drying at 110°, not more than 2 per cent. Arsenic limit, 5 parts per million. Lead limit, 25 parts per million. It complies also with limit tests for aluminium, calcium and insoluble matter, chloride, sulphate and iron.

Action and Uses.—Exsiccated sodium carbonate is largely used as a bath powder and water softener. It is also the basis of bath salts for use in gout and rheumatism. Exsiccated sodium carbonate is employed in the preparation of pill masses such as Pilula Ferri Carbonatis.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

SODII CHAULMOOGRAS

(Sod. Chaulmoog.)

Sodium Chaulmoograte

Synonym—Sodium Gynocardate.

Sodium chaulmoograte consists of a mixture of the sodium salts of chaulmoogric acid and other fatty acids obtained by the alkaline hydrolysis of chaulmoogra oil or of selected fractions of these acids. It occurs as a yellow or buff-coloured, granular solid or powder.

Soluble in water, giving a neutral or faintly alkaline solution.

Action and Uses.—Sodium chaulmoograte has an action similar to that of oil of chaulmoogra and is employed for the same purpose in the treatment of leprosy. The soluble sodium salts, or the ethyl esters, are now preferred to the expressed chaulmoogra and hydnocarpus oils. Injections are said to be better tolerated over a long period of treatment. Sodium chaulmoograte is **administered** in pills or capsules, or in 3 per cent. w/v solution for hypodermic, intramuscular, or intravenous use. Solutions for **injection** may be sterilised by tyndallisation at 60°

for one hour on three successive days. Weak solutions of sodium chaulmoograte may be sterilised by filtration.

Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

SODII·CHLORAS

(Sod. Chloras)

Sodium Chlorate

$NaClO_3 = 106·5$

Sodium chlorate may be prepared by the electrolysis of a hot solution of sodium chloride. It occurs in the form of colourless, odourless, translucent, tetrahedral crystals or as a white, crystalline powder, having a cooling, saline taste. The aqueous solution is neutral to litmus. It resembles potassium chlorate in all its properties and, on account of its liability to explosion under various conditions, the same precautions should be observed in dealing with it as with the potassium salt. On heating, it melts and then decomposes with the evolution of oxygen, leaving a residue of sodium chloride. The aqueous solution is coloured greenish-yellow on warming with hydrochloric acid and the odour of chlorine is evolved. It should be **stored** in well-closed containers.

Soluble in water (about 1 in 1), alcohol (1 in 100), boiling alcohol (1 in 40) and glycerin (1 in 5).

Standard.—Sodium chlorate, determined by the method of the British Pharmacopœia for Potassii Chloras, contains not less than 99 per cent. of $NaClO_3$; each millilitre of N/10 sodium thiosulphate is equivalent to 0·001774 gramme of $NaClO_3$. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. 0·5 gramme complies with the limit test for chlorides. 1 gramme complies with the limit test for sulphates.

Action and Uses.—Sodium chlorate is sometimes used for stomatitis, relaxed sore throats, etc., in the form of gargle, pastille and lozenge, in place of potassium chlorate which it closely resembles in its properties. It is also used as an ingredient of non-poisonous weed-killers.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

SODII CHLORIDUM

(Sod. Chlorid.)

Sodium Chloride

$NaCl = 58·45$

Sodium chloride is obtained by the purification of common salt. Deposits of salt occur in many parts of the world; the largest is found

in Galicia, but important beds are found in England and elsewhere. In cases where the salt deposit is under water, the brine is pumped to the surface and evaporated; in other cases the salt may be removed dry or, more usually, by pumping down water and subsequently withdrawing the brine. In all cases the brine obtained contains sulphates and chlorides of magnesium and calcium, the chlorides being responsible for the deliquescence of impure sodium chloride. These impurities may be removed by treatment with sodium carbonate or barium carbonate before evaporating the brine. Pure sodium chloride may be prepared by passing hydrogen chloride into strong brine. Sodium chloride occurs in colourless, odourless, transparent, cubical crystals or as a white, crystalline powder, having a saline taste.

Soluble in water (1 in 3), the solubility being nearly independent of the temperature, and glycerin (1 in 10); insoluble in alcohol (90 per cent.).

Standard, B.P.—Sodium chloride contains not less than 99 5 per cent. of NaCl, calculated on the substance dried at 130°. Loss on drying at 130°, not more than 1 per cent. Arsenic limit, 1 part per million. Lead limit, 5 parts per million. A 10 per cent. w/v aqueous solution is neutral to litmus. It complies also with limit tests for iodide and bromide, barium, calcium and magnesium, sulphate, and iron.

Action and Uses.—Sodium chloride and other soluble salts of a similar nature, when taken in large amounts, produce important physical effects. Osmosis is the principal physical change included under salt action, and osmotic processes play an important part in facilitating the movement of fluids and the diffusion of salts in the organism. The term isotonic has come to mean a solution having the same osmotic tension as that of human blood serum; higher molecular concentrations are spoken of as hypertonic and lower concentrations as hypotonic. An isotonic saline solution contains 0·9 per cent. w/v of sodium chloride. In the living body, however, osmotic processes, although important, are not always the deciding factor in the action of salts; thus the ions, K, Na, Li, Cl, Br, are absorbed rapidly from the intestines in any concentration, whilst the Ca ion is absorbed more slowly and the Mg and SO_4 ions hardly at all. A saline purgative is, therefore, a salt which is not capable of absorption or is at most only slowly absorbed, and which by osmosis attracts fluid from the intestinal cell-wall and renders the contents of the bowel more watery. From 5 to 12 grammes of sodium chloride is taken daily in the food and a corresponding amount is excreted in the urine. A decrease in the amount of chloride excreted occurs in certain cases of pneumonia and in continuous fevers. The most important action of the salt is that on the kidneys and is common to all salts which are absorbed. When salts reach the blood by absorption the flow of urine is increased; no matter how the salts are introduced into the blood, the effect must be to increase the liquid part of the blood; this hydræmic plethora causes dilatation of the renal vessels, a greater rate of blood flow and an increased secretion of urine. Sodium chloride will, however, according to its concentration, influence the passage of fluids into or out of the cells and may, therefore, be

employed as a purgative or laxative. If the quantity is large and highly concentrated, this withdrawal of water may irritate the cells of the mucous membrane and set up reflex vomiting.

Sodium chloride may be, and sometimes is, used as an emetic. As Liquor Sodii Chloridi Physiologicus, it is employed in large quantities for subcutaneous, intravenous, or rectal injection when the body has lost much fluid, as in hæmorrhage, acute diarrhœa, etc., also to prevent shock during prolonged operations, the injection being given at a temperature of about 40°. It is similarly employed in uræmia, diabetic coma, pneumonia and other intoxications to promote excretion of poisonous substances, and it is a suitable vehicle for hypodermic injections of alkaloids, etc. A 20 per cent. w/v solution has been used as a sclerosing agent for varicose veins. Solutions of sodium chloride for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Normal saline solution is employed in surgery to cleanse cavities and wounds. Hypertonic solutions or "packs" of sodium chloride are applied to carbuncles and other inflammatory processes to reduce local œdema. Saline solutions, 10 to 30 per cent. w/v, are also employed intravenously in acute intestinal obstruction after operation, post-concussional treatment and to reduce the œdema surrounding a cerebral tumour prior to operative procedures. The introduction of isotonic saline into the circulation after severe hæmorrhage or to combat shock is of little value, since in fifteen to twenty minutes most of the saline has been excreted during the profound diuresis which ensues. Hypertonic injections are a little better, the blood pressure returning to its former low level within an hour. More satisfactory results are obtained with Injectio Sodii Chloridi et Acaciæ, solutions of dextrose, 5 per cent. w/v, or by transfusing blood from a person of the same blood group or, failing that, from a "universal donor."

A salt-poor diet has been used in recent times as a treatment for renal disease with dropsy. In carefully selected cases great improvement has been obtained, patients who have been dropsical for years often losing all their œdema. A salt-poor diet is also used in various other conditions, particularly hyperpiesis. Sodium metabolism is intimately connected with the activity of the cortex of the suprarenal gland and sodium chloride in large doses, from 10 to 15 grammes daily, is sometimes effective in the treatment of Addison's disease and may replace or supplement treatment with extract of suprarenal cortex.

An ointment composed of equal parts of sodium chloride and soft paraffin is applied for ringworm. A solution of sodium chloride is used as a rectal injection for the expulsion of thread-worms. Sodium chloride baths are taken for the treatment of gout and rheumatism and for certain skin diseases.

Preparations

Injectio Sodii Chloridi et Acaciæ, B.P.—(Inj. Sod. Chlorid. et Acac.)—Injection of Sodium Chloride and Acacia. A sterile solution containing sodium chloride, 0·9 per cent. w/v, and acacia, 6 per cent. w/v, in freshly distilled water.

Liquor Dextrosi et Sodii Chloridi, B.P.C.—(Liq. Dextros. et Sod. Chlorid.)—Dextrose and Sodium Chloride Solution. *Syn.*—Glucose-saline Solution. A sterile aqueous solution containing 5 per cent. w/v of dextrose and 0·9 per cent. w/v of sodium chloride.

Liquor Ringer, B.P.C.—(Liq. Ringer)—Ringer's Solution. It contains sodium, potassium and calcium chlorides and sodium bicarbonate, and is isotonic with frogs' blood serum.

Liquor Ringer-Locke, B.P.C.—(Liq. Ringer-Locke)—Ringer-Locke Solution. It contains sodium, potassium and calcium chlorides, dextrose and sodium bicarbonate, and is isotonic with mammalian blood serum.

Liquor Ringer-Tyrode, B.P.C.—(Liq. Ringer-Tyrode)—Ringer-Tyrode Solution. It contains sodium, potassium, calcium and magnesium chlorides, dextrose, sodium acid phosphate and sodium bicarbonate, and is isotonic with mammalian blood serum.

Liquor Sodii Chloridi Physiologicus, B.P.—(Liq. Sod. Chlorid. Physiol.)—Physiological Solution of Sodium Chloride. *Syn.*—Physiological Saline Solution; Normal Saline Solution. A sterile aqueous solution containing sodium chloride, 0·9 per cent. w/v. When required for intravenous injection it should be prepared with sterilised water for intravenous injections, and should be used within twenty-four hours of its preparation.

This solution, prepared with 0·91 per cent. w/v of sodium chloride, was included in the British Pharmaceutical Codex, 1923, under the name of Liquor Sodii Chloridi.

Pulvis Boracis Compositus, B.P.C.—(Pulv. Borac. Co.)—Compound Borax Powder. *Syn.*—Pulvis Alkalinus Compositus; Compound Alkaline Powder. Sodium bicarbonate, sodium chloride and borax, equal parts.

Pulvis Sodii Chloridi Compositus, B.P.C.—(Pulv. Sod. Chlorid. Co.)—Compound Powder of Sodium Chloride. Sodium chloride, sodium bicarbonate, borax and sucrose, equal parts.

Solvellæ Boracis Compositæ, B.P.C.—(Solv. Borac. Co.)—Compound Solution-Tablets of Borax. Each tablet contains 5 grains of borax, 2½ grains of sodium chloride, $\frac{1}{20}$ grain of thymol and 2½ grains of sodium bicarbonate.

SODII CITRAS

(Sod. Cit.)

Sodium Citrate

$C_6H_5O_7Na_3,2H_2O = 294·1$

Sodium citrate, $COONa·C(OH)(CH_2·COONa)_2,2H_2O$, may be obtained by neutralising citric acid with sodium carbonate in aqueous solution and crystallising from the hot solution. It occurs in the form of odourless, white, granular crystals or as a crystalline powder, having a saline taste. It is slightly deliquescent in moist air and is efflorescent in warm, dry air. On the addition of calcium chloride solution to a solution of sodium citrate, a clear liquid is produced in the cold which throws down a white, granular precipitate on boiling. A form of sodium citrate is also obtainable containing five and a half molecules of water of crystallisation. Sodium citrate should be **stored** in well-closed containers.

Soluble in water (1 in 2), boiling water (2·5 in 1); insoluble in alcohol (90 per cent.).

Standard, B.P.—Sodium citrate contains not less than 99 per cent. of $C_6H_5O_7Na_3,2H_2O$. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies also with limit tests for alkalinity or acidity, tartrate, oxalate, chloride and sulphate.

Action and Uses.—Sodium citrate resembles potassium citrate in its properties and is similarly employed. It is used to raise the alkalinity of the blood in acidosis. It combines with the calcium salts of the blood, so as to delay the action of the fibrin ferment and lower the rate of clotting; added to milk its action is similar, so that the formation of large curds by the rennet of the stomach is prevented. It is employed for this action in the feeding of infants and invalids, milk being rendered more readily digestible by the addition of sodium citrate. It may be used in the proportion of 1 to 3 grains in each fluid ounce of milk, and for infant feeding a solution containing 2 grains of sodium citrate in 60 minims of water is commonly employed for each feed. Tablets of sodium citrate are frequently used for this purpose. The calcium salts are not removed from the milk; it seems probable that calcium citrate is formed, which salt, although slightly soluble, does not ionise, so that the calcium is not available for the purposes of the ferment. Although sodium citrate delays coagulation of blood *in vitro*, it is said to accelerate coagulation when given intravenously or intramuscularly; hence solution of sodium citrate in 5 per cent. w/v solution is sometimes given intravenously to prevent hæmorrhage at operations, etc. Intramuscularly, it is often given in a 30 per cent. w/v solution, 15 millilitres (225 minims) being injected into each buttock. To dilute blood and prevent its clotting a 2 per cent. w/v solution is used. For blood transfusion purposes 40 millilitres of a 3·8 per cent. solution should be added to the flask in which the blood is to be collected. This amount is adequate to prevent the clotting of 650 millilitres of blood. A solution of the same strength is usually employed for washing out the syringes and apparatus beforehand. Solution of sodium chloride with sodium citrate (1 part of each in 50) is applied to ulcers to promote the flow of lymph. Sodium citrate is **administered** in solution. A solution for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 1 to 4 grammes ($\frac{1}{4}$ to 1 drachm).

SODII ET POTASSII TARTRAS

(Sod. et Pot. Tart.)

Sodium Potassium Tartrate

$C_4H_4O_6NaK,4H_2O = 282·2$

Synonyms—Potassii et Sodii Tartras; Rochelle Salt; Seignette's Salt; Soda Tartarata.

Sodium potassium tartrate, $COONa·(CHOH)_2·COOK,4H_2O$, may

be prepared by neutralising potassium acid tartrate with sodium carbonate in the presence of water and crystallising. It occurs as colourless, odourless crystals or as a white, crystalline powder, having a saline, cooling taste.

Soluble in water (1 in 1·5); almost insoluble in alcohol (90 per cent.).

Standard, B.P.—Sodium potassium tartrate contains not less than 99 per cent. and not more than the equivalent of 104 per cent. of $C_4H_4O_6NaK,4H_2O$. Arsenic limit, 2 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for alkalinity or acidity, chloride, sulphate and iron.

Action and Uses.—Sodium potassium tartrate is a typical saline cathartic, causing a watery evacuation of the bowel without producing irritation. In small doses it is a diuretic and renders the urine less acid. It is employed in gout and rheumatism, to relieve hepatic congestion, and generally as a mild purgative. It is largely **administered** as Pulvis Effervescens Compositus (Seidlitz powder). Pulvis Effervescens Compositus Duplex (double-strength Seidlitz powder) contains twice as much sodium potassium tartrate as Pulvis Effervescens Compositus, and Pulvis Effervescens Compositus Fortis (extra-strong Seidlitz powder) contains one and a half times as much; the three powders contain the same quantities of sodium bicarbonate and tartaric acid. Sodium potassium tartrate is also used largely for the preparation of solutions of metallic tartrates such as Fehling's solution.

Dose.– 8 to 16 grammes (2 to 4 drachms).

Preparations

Pulvis Effervescens Compositus, B.P.—(Pulv. Efferv. Co.)—Compound Effervescent Powder. *Syn.*—Pulvis Sodæ Tartaratæ Effervescens; Effervescent Tartarated Soda Powder; Seidlitz Powder. No. 1 powder contains 7·5 grammes (about 116 grains) of sodium potassium tartrate, with sodium bicarbonate. No. 2 powder contains tartaric acid. Dose.– Dissolve No. 1 powder in a tumbler of cold or warm water, and add No. 2 powder. The liquid should be taken while effervescing.

Pulvis Effervescens Compositus Duplex, B.P.C.—(Pulv. Efferv. Co. Dup.)—Double Compound Effervescent Powder. *Syn.*—Double-strength Seidlitz Powder. No. 1 powder contains 15 grammes (231½ grains) of sodium potassium tartrate, with sodium bicarbonate; No. 2 powder contains tartaric acid. It contains twice the amount of sodium potassium tartrate contained in compound effervescent powder. Dose.– Dissolve No. 1 powder in a tumbler of cold or warm water; then add No. 2 powder. The liquid should be taken while effervescing.

Pulvis Effervescens Compositus Fortis, B.P.C.—(Pulv. Efferv. Co. Fort.)—Strong Compound Effervescent Powder. *Syn.*—Extra-strong Seidlitz Powder. No. 1 powder contains 11·25 grammes (173½ grains) of sodium potassium tartrate, with sodium bicarbonate; No. 2 powder contains tartaric acid. It contains 50 per cent. more sodium potassium tartrate than is contained in compound effervescent powder. Dose.– Dissolve No. 1 powder in a tumbler of cold or warm water; then add No. 2 powder. The liquid should be taken while effervescing.

SODII FLUORIDUM
(Sod. Fluor.)
Sodium Fluoride
$NaF = 42{\cdot}00$

Sodium fluoride is prepared technically by fusing sodium silicofluoride with sodium carbonate, lixiviating and evaporating the solution, or by boiling cryolite, $3NaF,AlF_3$, with solution of sodium hydroxide of at least 1·380 specific gravity, when sodium fluoride separates as a crystalline powder. The pure salt may be prepared by neutralising a solution of hydrogen fluoride with a solution of sodium carbonate or sodium hydroxide in a platinum dish, evaporating the solution to dryness, exposing the residue to a strong heat for some time, and allowing to cool. Sodium fluoride occurs in the form of anhydrous, clear, lustrous cubes or as a white, crystalline powder, having a saline taste. The aqueous solution has an alkaline reaction and attacks glass; on heating, the salt decrepitates, and at a higher temperature melts without decomposition. When heated with concentrated sulphuric acid, vapours of hydrofluoric acid are given off which etch glass. It combines with borax to form sodium fluoborate, $6NaF,Na_2B_2O_4$, with hydrogen fluoride forming the so-called acid fluoride, $NaHF_2$, and with other fluorides forming double fluorides.

Soluble in water (1 in 25), scarcely more soluble in hot water; insoluble in alcohol.

Standard.—Sodium fluoride contains not less than 90 per cent. of NaF.

Assay.—Dissolve about 0·8 gramme, accurately weighed, in 50 millilitres of water and neutralise with carbonate-free alkali, using phenolphthalein as indicator; add sufficient neutral sodium chloride so that some remains undissolved at the end of the operation and titrate with M/10 potassium aluminium sulphate, using methyl red as indicator, the whole being kept at 80°; each millilitre of M/10 potassium aluminium sulphate is equivalent to 0·0126 gramme of NaF.

Action and Uses.—Sodium fluoride has been given internally and by hypodermic injection in phthisis and in toxic goitre; it should be **administered** in mixture form in very dilute solution. In the treatment of toxic goitre 60 minims of a 2 per cent. w/v solution may be given three times a day with potassium iodide. Hypodermically it may be used as a solution (1 in 200), at which strength it has no caustic action. Sodium fluoride is used technically to prevent lactic and butyric fermentation in the manufacture of alcohol, 10 to 15 grammes being added to 100 litres of mash. It is said to arrest vital fermentations (due to development of living organisms) in the proportion of 1 per cent., but to have no disturbing action on chemical fermentations such as diastasic action. A 0·5 per cent. solution destroys most bacteria. Since it does not coagulate albumin, bacteria are not protected from its action by a coating of albumin. In very fine powder it is dusted on birds

to destroy vermin and is said to be fatal to cockroaches when placed in their runs.

Chronic poisoning may occur from the continued ingestion of small quantities of fluorides or from the inhalation of hydrofluoric acid, and is characterised by slowly progressive wasting, anæmia and brittleness of the bones. In cases of **poisoning** by large doses of sodium fluoride, the stomach should be washed out with lime water or weak solution of calcium chloride, and calcium chloride should be administered intravenously.

Dose.– 0·005 to 0·03 gramme ($\frac{1}{12}$ to $\frac{1}{2}$ grain).

AMMONII FLUORIDUM.—Ammonium fluoride, NH_4F, occurs in colourless, deliquescent crystals or in crystalline masses, with a pungent, saline taste. It is fusible, and more volatile than ammonium chloride. It attacks glass with the formation of ammonia and ammonium silicofluoride and should therefore be stored in gutta percha vessels or in glass bottles coated internally with paraffin wax. It is soluble in water, the solution losing ammonia on evaporation. Ammonium fluoride has been suggested for use in the treatment of phthisis, enlargement of the spleen, and goitre. It should be administered in very dilute aqueous solution. Dose.– 0·005 to 0·03 gramme ($\frac{1}{12}$ to $\frac{1}{2}$ grain).

POTASSII FLUORIDUM.—Potassium fluoride, KF, occurs in colourless, cubical or prismatic crystals or as a crystalline powder, having a sharp, saline taste. It is deliquescent, and attacks glass and porcelain from which it dissolves the silica. It is very soluble in water, the solution having an alkaline reaction. Potassium fluoride is seldom employed in medicine.

SODII FORMAS

(Sod. Form.)

Sodium Formate

$CHO_2Na,H_2O = 86·02$.

Sodium formate, $H{\cdot}COONa,H_2O$, may be prepared by neutralising formic acid with sodium carbonate or bicarbonate, evaporating and crystallising. It occurs as a white, crystalline powder, deliquescent in moist air, and having a bitter, saline taste. On heating, the salt melts in its water of crystallisation, afterwards solidifying to a pearly, anhydrous mass. The anhydrous salt melts at about 254°; it yields no acid distillate when strongly heated, but is decomposed into hydrogen and sodium oxalate. With sulphuric acid it evolves carbon monoxide. Its aqueous solution on boiling readily reduces many metallic salts and yields a red colour with ferric chloride solution.

Soluble in water (1 in 2) and glycerin.

Standard.—Sodium formate, determined by the method for Calcii Formas, contains not less than 96 per cent. of CHO_2Na,H_2O; each millilitre of N/10 potassium permanganate is equivalent to 0·004301 gramme of CHO_2Na,H_2O. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million.

Action and Uses.—Sodium formate exerts a marked diuretic action and is used, often in association with potassium or iron salts, for its supposed tonic effect on unstriped muscle as a general tonic in debility, in convalescence from acute disease, and in cardiac weakness. It has also been used in lumbago and rheumatism. It may be **administered** in mixture form or as Elixir Formatum Compositum, and is often combined with hypophosphites or glycerophosphates. It is sometimes given hypodermically in doses of 0·3 gramme (5 grains) in 2 millilitres (30 minims). Solutions for **injection** may be sterilised by heating at 100° for thirty minutes, by tyndallisation, or by filtration.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

Preparation

Elixir Formatum Compositum, B.P.C.—(Elix. Form. Co.)—Compound Elixir of Formates. *Syn.*—Elixir Formatum cum Strychnina; Elixir of Formates with Strychnine. Each fluid drachm contains about 3 grains each of sodium formate and potassium formate, and 1¼ minims of solution of strychnine hydrochloride, with simple elixir. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SODII GLYCEROPHOSPHAS

(Sod. Glycerophosph.)

Sodium Glycerophosphate

$C_3H_7O_6PNa_2,5\frac{1}{2}H_2O = 315{\cdot}2$

Synonym—Sodium Glycerylphosphate.

Sodium glycerophosphate is the sodium salt of β-glycerophosphoric acid and may be prepared by heating sodium acid phosphate with two molecular proportions of glycerin and hydrolysing the resulting diglyceryl ester with sodium hydroxide. It occurs as large, colourless, crystalline masses or as a white, crystalline powder. Sodium β-glycerophosphate may be distinguished from the α-salt by the fact that it does not reduce cold aqueous periodic acid.

Soluble in water (1 in 4).

Standard.—Sodium glycerophosphate contains not less than 98 per cent. and not more than the equivalent of 102 per cent. of $C_3H_7O_6PNa_2,5\frac{1}{2}H_2O$. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. Limit of free alkali (calculated as Na_2CO_3), 0·5 per cent. Limit of free phosphate (calculated as P_2O_5), 0·5 per cent.

Assay.—Dissolve 2·5 grammes in water and neutralise with N/1 hydrochloric acid, using thymol blue as indicator; the volume of acid required represents the free alkali present; each millilitre of N/1 hydrochloric acid is equivalent to 0·053 gramme of Na_2CO_3. To the neutralised solution add 40 millilitres of 30 per cent. calcium chloride solution (neutral to thymol blue), boil for five minutes, cool and titrate with N/1 sodium hydroxide; the volume required represents the free phosphate

present; each millilitre of N/1 sodium hydroxide is equivalent to 0·071 gramme of P_2O_5. Repeat the titration of 2·5 grammes with N/1 hydrochloric acid using bromocresol green as indicator, subtract from the volume used the sum of the volumes of N/1 hydrochloric acid required for the free alkali determination, and of N/1 sodium hydroxide for the phosphate determination, and calculate the remainder as sodium glycerophosphate; each millilitre of N/1 hydrochloric acid is equivalent to 0·3152 gramme of $C_3H_7O_6PNa_2,5\frac{1}{2}H_2O$.

Action and Uses.—Sodium glycerophosphate in solid form is employed, usually in association with casein, in nervous debility, anæmia and general weakness. It is also used as a reagent for the determination of plasma phosphatases. Solutions for **injection** may be sterilised by heating at 100° for thirty minutes, by tyndallisation, or by filtration.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

SODII GLYCEROPHOSPHAS LIQUIDUS

(Sod. Glycerophosph. Liq.)

Solution of Sodium Glycerophosphate

Solution of sodium glycerophosphate is an aqueous solution containing about 50 per cent. w/w of a mixture of the neutral sodium salts of α- and β-glycerophosphoric acids, and may be prepared by the interaction of sodium carbonate and glycerophosphoric acid. It occurs as a colourless or not more than faintly yellow, syrupy liquid. A solution containing 75 per cent. is also found in commerce; it occurs as a thick syrup, often partly crystallised.

Miscible in all proportions with water.

Standard.—Solution of sodium glycerophosphate contains not less than 48 per cent. and not more than 52 per cent. by weight of $C_3H_7O_6PNa_2,5\frac{1}{2}H_2O$. Specific gravity, 1·28 to 1·32. Refractive index, 1·395 to 1·405. Arsenic limit, 2·5 parts per million. Lead limit, 10 parts per million. Mix 5 grammes in a stoppered cylinder with 20 millilitres of dehydrated alcohol, add 5 grammes of recently ignited calcium sulphate, shake until the supernatant liquid is practically clear, filter into a 100 millilitre beaker, wash the residue in the cylinder with a few millilitres of dehydrated alcohol, evaporate the filtrate and washings, dry the residue at 70° for one hour, and weigh; the residue weighs not more than 0·10 gramme (limit of free glycerin). Limit of free alkali (calculated as Na_2CO_3), 0·5 per cent. Limit of free phosphate (calculated as P_2O_5), 0·5 per cent.

Assay.—Dilute 5 grammes with a little water and neutralise with N/1 hydrochloric acid using thymol blue as indicator; the volume of acid required represents the free alkali present; each millilitre of N/1 hydrochloric acid is equivalent to 0·053 gramme of Na_2CO_3. To the

neutralised solution add 40 millilitres of 30 per cent. calcium chloride solution (neutral to thymol blue), boil for five minutes, cool, and titrate with N/1 sodium hydroxide; the volume required represents the free phosphate present; each millilitre of N/1 sodium hydroxide is equivalent to 0·071 gramme of P_2O_5. Repeat the titration of 5 grammes with N/1 hydrochloric acid, using bromocresol green as indicator; subtract from the volume used the sum of the volumes of N/1 hydrochloric acid required for the free alkali determination, and of N/1 sodium hydroxide for the phosphate determination, and calculate the remainder as sodium glycerophosphate; each millilitre of N/1 hydrochloric acid is equivalent to 0·3152 gramme of $C_3H_7O_6PNa_2,5\frac{1}{2}H_2O$.

Action and Uses.—Solution of sodium glycerophosphate resembles in its action the other glycerophosphates (see Acidum Glycerophosphoricum). It is given with other glycerophosphates in the form of Glycerinum Glycerophosphatum, Syrupus Glycerophosphatum Compositus, or other compound syrups.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

SODII HYDROXIDUM

(Sod. Hydrox.)

Sodium Hydroxide

$NaOH = 40·00$

Sodium hydroxide is usually obtained by the electrolysis of an aqueous solution of sodium chloride or by electrolysis of the fused salt. It occurs in scales or pellets, and in sticks or fused masses which are dry, hard and brittle, and break with a crystalline fracture. It is powerfully alkaline and corrosive, and rapidly destroys organic tissues. Exposed to the air, it rapidly absorbs moisture and liquefies, but subsequently becomes solid again and effloresces in consequence of the absorption of carbon dioxide with formation of sodium carbonate. When heated to about 525°, sodium hydroxide melts to a clear, viscid liquid, and at a bright red heat it slowly volatilises unchanged. The variety described as "purified by alcohol" was prepared by solution in alcohol, filtration to remove the less soluble carbonate and other salts and evaporation to dryness; an equally pure product is now obtained by the electrolytic processes of manufacture. A solution of sodium hydroxide free from carbonate may be obtained by dissolving the hydroxide in an equal weight of water; sodium carbonate is insoluble in the concentrated solution and may be separated by decantation or by filtration through asbestos. A concentrated aqueous solution cooled below —10° deposits thick, tabular crystals of the hydrate, $NaOH,7H_2O$, which melt above 6°. Sodium hydroxide should be **stored** in well-closed containers.

Soluble in water (1 in 1) and alcohol (90 per cent.).

Standard, B.P.—Sodium hydroxide contains not less than 95 per

cent. of total alkali, calculated as NaOH. Arsenic limit, 5 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for carbonate, and for aluminium, iron and matter insoluble in hydrochloric acid.

Action and Uses.—Sodium hydroxide has properties which closely resemble those of potassium hydroxide, and may, in many cases, be similarly employed.

SODII PEROXIDUM.—Sodium peroxide, Na_2O_2, is a white, amorphous, very hygroscopic powder. It is an extremely powerful oxidising agent, and is used chiefly in bleaching, liberating hydrogen peroxide when added to ice-cold, diluted mineral acids.

SODII HYPOPHOSPHIS

(Sod. Hypophosph.)

Sodium Hypophosphite

$NaH_2PO_2 = 88{\cdot}03$

Sodium hypophosphite may be obtained by the interaction of sodium carbonate and calcium hypophosphite, with subsequent filtration and careful evaporation of the filtrate to dryness at a low temperature. It occurs as a white, deliquescent, odourless, granular powder, having a bitter, nauseous taste. The aqueous solution is neutral or slightly alkaline to litmus. On heating to about 200°, it is decomposed with evolution of spontaneously inflammable hydrogen phosphide. It is very liable to explode when mixed with nitrates, chlorates, or other oxidising agents. The aqueous solution acidified with hydrochloric acid and added drop by drop to mercuric chloride solution produces a white precipitate of mercurous chloride, which becomes grey on adding an excess; acidified with sulphuric acid and warmed with copper sulphate solution, it yields a red precipitate of cuprous hydride, which on boiling evolves hydrogen. If allowed to crystallise from water, or alcohol containing water, it has the formula NaH_2PO_2,H_2O.

Soluble in water (1 in 1), alcohol (90 per cent.) (1 in 30) and glycerin (1 in 2); insoluble in ether.

Standard.—Sodium hypophosphite, determined by the method for Calcii Hypophosphis, contains not less than 97 per cent. of NaH_2PO_2, calculated on the substance dried at 110°; each millilitre of N/10 iodine is equivalent to 0·004402 gramme of NaH_2PO_2. Loss on drying at 110°, not more than 2 per cent. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. It complies with the limit tests for phosphate and barium in Calcii Hypophosphis.

Action and Uses.—Sodium hypophosphite resembles the hypophosphites of calcium and potassium in its action, and is usually prescribed therewith (see Acidum Hypophosphorosum).

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

SODII IODIDUM
(Sod. Iod.)
Sodium Iodide
NaI = 149·9

Sodium iodide may be prepared by methods analogous to those described for the preparation of potassium iodide, but the final recrystallisation must be conducted above 20° in order to avoid the deposition of the hydrated salt, $NaI,2H_2O$. It occurs as a white, odourless, granular, crystalline powder, with a saline, slightly bitter taste. It is deliquescent in moist air and is then liable to decomposition, becoming yellow in colour owing to liberation of iodine. The aqueous solution is slightly alkaline to litmus and gradually becomes coloured from liberation of free iodine on exposure to light and air. It melts at a dull red heat with loss of some iodine; at a higher temperature it slowly volatilises. On cooling, the fused substance solidifies to a pearly, crystalline mass. When sodium iodide is dissolved in water to form a strong solution, considerable heat is developed due to combination of the anhydrous salt with water; under similar conditions, potassium iodide produces a marked reduction in temperature. It should be **stored** in well-closed containers.

Soluble in water (about 2 in 1), alcohol (90 per cent.) (1 in 3) and glycerin (1 in 1).

Standard, B.P.—Sodium iodide contains not less than 99 per cent. of NaI, calculated on the substance dried at 110°. Loss on drying at 110°, not more than 5 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. It complies also with a test for absence of barium and with limit tests for alkali, iodate, cyanide and sulphate.

Action and Uses.—The properties of sodium iodide closely resemble those of potassium iodide; it is, however, considered to be less irritating to the stomach and less depressing (see Potassii Iodidum). Sodium iodide in the form of solution is also employed for pyelographic purposes. A solution of sodium iodide has been used by intravenous injection in the treatment of rheumatism and gonorrhœal epididymitis. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. A small proportion, usually about 1 in 200,000, is added to table salt for the prevention of goitre and the preparation is known as "iodised salt."

Dose.– 0·3 to 2 grammes (5 to 30 grains).

SODII MORRHUAS
(Sod. Morrh.)
Sodium Morrhuate

Sodium morrhuate consists of a mixture of sodium salts of acids

obtained by the alkaline hydrolysis of cod-liver oil. It occurs as a yellowish or buff-coloured solid. Sodium morrhuate is of variable composition and does not always form a clear, stable solution. It is also available in the form of solution and such solutions are usually more satisfactory in use. Care must be taken to prevent oxidation of the fatty acids. It should be **stored** in well-closed containers.

Soluble in water, giving a neutral or faintly alkaline solution.

Standard.—One gramme of sodium morrhuate dissolves completely to form a clear solution in 10 millilitres of warm water.

Action and Uses.—Sodium morrhuate is used largely as a sclerosing agent for varicose veins. A 5 per cent. solution is usually employed, 0·5 to 1 millilitre being injected into several parts of the vein being treated. If this fails to give the desired result after one month, injections of a 10 per cent. solution may be used; as much as 10 millilitres may be injected at one time. It is considered to have advantages over sodium or lithium salicylate or quinine and urethane for this purpose. After injections of sodium morrhuate, there is greater probability of recanalisation of the veins than after injections of sodium or lithium salicylate or quinine and urethane. In some patients sodium morrhuate injections give rise to an urticarial skin eruption. Sodium morrhuate is sometimes injected for hæmorrhoids. It has been employed in the treatment of lupus and leprosy, in doses of 0·5 to 2 millilitres (8 to 30 minims) of a 3 per cent. w/v solution injected subcutaneously or intramuscularly. Solutions of sodium morrhuate for **injection** may be sterilised by heating in an autoclave or by tyndallisation. Weak solutions of sodium morrhuate may be sterilised by filtration.

Preparation

Injectio Sodii Morrhuatis, B.P.C.—(Inj. Sod. Morrh.)—Injection of Sodium Morrhuate. 5 per cent. w/v. Dose.– 0 5 to 5 millilitres (8 to 75 minims), by intravenous injection.

SODII NITRIS

(Sod. Nitris)

Sodium Nitrite

$NaNO_2 = 69·01$

Sodium nitrite may be prepared by fusing sodium nitrate with metallic lead, added in small fragments. The fused salt is poured off from the separated lead oxide, allowed to cool, and recrystallised from water. It is also produced by the absorption of oxides of nitrogen in solution of sodium hydroxide. Sodium nitrite occurs in colourless or slightly yellow crystals or as a slightly yellow, granular powder, with a mild, saline taste; it readily deliquesces on exposure to air. It melts when

heated and at a red heat is decomposed with formation of sodium oxide and evolution of nitrogen, oxygen, and nitrogen peroxide. It should be **stored** in well-closed containers.

Soluble in water (1 in 1·5) and alcohol (90 per cent.) (1 in 50).

Standard, B.P.—Sodium nitrite contains not less than 95 per cent. of $NaNO_2$. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies also with limit tests for chloride and sulphate.

Action and Uses.—Sodium nitrite closely resembles glyceryl trinitrate in its action; the effect is produced rather more slowly than with the latter drug, but persists over a longer period. It is used especially in angina pectoris and asthma to ward off attacks and to relieve the symptoms during an attack; it is used also to lessen arterial tension in renal disease, and generally as a vasodilator. Spiritus Ætheris Nitrosi is used as a diaphoretic in incipient colds and as a mild diuretic, it is usually prescribed in mixtures with other diaphoretics such as Liquor Ammonii Acetatis Dilutus. When dispensed with potassium iodide, it should previously be neutralised by the addition of a small quantity of a bicarbonate. Sodium nitrite is mostly excreted as nitrate in the urine. It is **administered** in solution, and is sometimes given with sodium iodide, or with vasodilators such as diluted erythrityl tetranitrate. It is **incompatible** with oxidising agents, phenazone, acetanilide, and caffeine citrate. In cases of **poisoning** by sodium nitrite, an emetic should be administered, the recumbent position maintained, and atropine given hypodermically.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

Preparations

Liquor Æthylis Nitritis, B.P.C.—(Liq. Æthyl. Nitrit.)—Solution of Ethyl Nitrite. A solution of ethyl nitrite, 2·5 to 3 per cent. w/w (equivalent to about 2 to 2·5 per cent. w/v) in a mixture of glycerin and dehydrated alcohol. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

This solution was included in the British Pharmacopœia, 1914, under the name of Liquor Ethyl Nitritis.

Nebula Hyoscinæ Composita, B.P.C.—(Neb. Hyoscin. Co.)—Compound Hyoscine Spray. Hyoscine hydrobromide, 0·057 per cent. w/v, cocaine hydrochloride, about 0·9 per cent. w/v, atropine sulphate, about 0·1 per cent. w/v, and sodium nitrite, 12·5 per cent. w/v, in glycerin and distilled water, coloured with solution of bordeaux B.

Spiritus Ætheris Nitrosi, B.P.—(Sp. Æther. Nitros.)—Spirit of Nitrous Ether. *Syn.*—Sweet Spirit of Nitre. An alcoholic solution containing not less than 1·25 per cent. and not more than 2·5 per cent. w/v of ethyl nitrite, together with acetaldehyde and other related substances. Alcohol content, 84 to 88 per cent. v/v of ethyl alcohol. Specific gravity, 0·838 to 0·842. It complies also with a limit test for acid. It should be stored in small, well-closed containers in a cool place and protected from light. Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Tabellæ Sodii Nitritis Compositæ, B.P.C.—(Tab. Sod. Nitrit. Co.)—Compound Tablets of Sodium Nitrite. Each tablet contains ½ grain of sodium nitrite, ⅛ grain of diluted erythrityl tetranitrate and 1 grain of ammonium hippurate. Dose.– 1 or 2 tablets.

SODII PERBORAS
(Sod. Perbor.)
Sodium Perborate
$NaBO_3,4H_2O = 153{\cdot}9$

Sodium perborate may be prepared by treating a saturated solution of borax with an equivalent quantity of sodium hydroxide and at least twice the theoretical quantity of hydrogen peroxide, or by the electrolytic oxidation of sodium borate. It occurs in transparent, prismatic crystals or as a white powder, and is stable in the crystalline form. Aqueous solutions behave similarly to solutions of hydrogen peroxide, decolourising potassium permanganate and liberating iodine from potassium iodide, but they are more stable at temperatures below 60°. 1 millilitre of the saturated aqueous solution mixed with 1 millilitre of dilute sulphuric acid and 0·2 millilitre of potassium dichromate solution imparts a blue colour to 2 millilitres of ether when the latter is shaken with the mixture and allowed to separate.

Soluble in water (about 1 in 40, at 15°) with some decomposition. The solution is alkaline and contains hydrogen peroxide which slowly decomposes at ordinary temperatures. It is more soluble in a solution of boric, tartaric, or citric acid and in glycerin; its solubility is also increased by the presence of magnesium or ammonium sulphate.

Standard.—Sodium perborate contains not less than 96 per cent. and not more than the equivalent of 103 per cent. of $NaBO_3,4H_2O$.

Assay.—Dissolve about 0·3 gramme, accurately weighed, in 50 millilitres of water; add 2 grammes of potassium iodide dissolved in 10 millilitres of water and 10 millilitres of dilute sulphuric acid and titrate with N/10 sodium thiosulphate, using starch mucilage as indicator; each millilitre of N/10 sodium thiosulphate is equivalent to 0·007694 gramme of $NaBO_3,4H_2O$.

Action and Uses.—Sodium perborate is employed as an antiseptic and deodorant, its activity being due to liberation of oxygen by contact with catalysts or organic matter in the presence of moisture. As an application to wounds and ulcers it may be used in solution (2 per cent.), or as a dusting powder (2 to 10 per cent.), or the dressing may be dusted with the powdered substance. The solution may also be used as a vaginal douche. In Vincent's angina, sodium perborate is employed as a thick paste and allowed to remain in the mouth for five minutes before rinsing out. As an antiseptic and healing application a 1 per cent. sodium perborate ointment in soft paraffin is sometimes used. Oxygenated water may be prepared by mixing 170 grammes of sodium perborate and 60 grammes of citric acid in one litre of water, the strength of this solution being approximately equivalent to a 10 volume solution of hydrogen peroxide. Sodium perborate is used in conjunction with a suitable catalyst in some "oxygen bath salts" and is employed extensively in laundry work. As a dentifrice it may be diluted with 2 to 4 parts of precipitated chalk.

CALCII PERBORAS.—Calcium perborate may be prepared by double decomposition from solutions of calcium chloride and sodium perborate. Its composition is uncertain; the formula $Ca(BO_3)_2,7H_2O$ has been assigned to it, but the salt rarely yields as much active oxygen as is indicated by this formula. It occurs as a bulky powder, but is not so stable as sodium perborate. Calcium perborate resembles sodium perborate in its properties. Mixed with twice its weight of precipitated chalk it has been used as a dentifrice.

MAGNESII PERBORAS.—Magnesium perborate may be prepared by the interaction of magnesium chloride and sodium perborate. Its composition is uncertain; the formula $Mg(BO_3)_2,7H_2O$ has been assigned to it, but the commercial salt rarely yields as much active oxygen as is indicated by this formula. It occurs as a somewhat bulky powder which gradually decomposes with loss of oxygen. Magnesium perborate mixed with twice its weight of precipitated chalk has been used as a dentifrice.

SODII PHENOLSULPHONAS

(Sod. Phenolsulphon.)

Sodium Phenolsulphonate

$C_6H_5O_4SNa,2H_2O = 232{\cdot}1$

Synonym—Sodium Sulphocarbolate.

Sodium phenolsulphonate, $C_6H_4(OH)SO_2ONa,2H_2O$, may be prepared by digesting a mixture of phenol in excess of sulphuric acid at a temperature of 100° to 110° for about six hours, and converting the *p*-phenolsulphonic acid so obtained into the sodium salt. It occurs in colourless, odourless, transparent, rhombic prisms, slightly efflorescent in dry air, and having a saline and somewhat bitter taste. On heating to a little above 100°, the salt loses all its water of crystallisation (15·5 per cent.) and becomes white. At a higher temperature it chars, giving off inflammable vapours having an odour of phenol, and finally leaving a residue of sodium sulphate equivalent to about 30·6 per cent. of the original salt.

Soluble in water (1 in 6), boiling water (10 in 7), alcohol (1 in 150), boiling alcohol (1 in10) and glycerin (1 in 5·5).

Standard.—Sodium phenolsulphonate contains not less than 99 per cent. and not more than the equivalent of 103 per cent. of $C_6H_5O_4SNa,2H_2O$. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. 1 gramme complies with the limit test for sulphates. 0·1 gramme dissolved in 10 millilitres of water is not rendered turbid by the addition of bromine solution (limit of free phenol).

Assay.—Dissolve about 0·15 gramme, accurately weighed, in 50 millilitres of distilled water in a glass-stoppered flask of about 500 millilitres capacity; add 50 millilitres of N/10 bromine and 5 millilitres of hydrochloric acid and allow to stand for fifteen minutes; add 2 grammes of potassium iodide dissolved in 5 millilitres of water and titrate the liberated iodine with N/10 sodium thiosulphate. Treat 50 millilitres of the N/10 bromine solution in the same way and titrate with

N/10 sodium thiosulphate; the difference between the two titrations represents the N/10 bromine absorbed by the sodium phenolsulphonate; each millilitre of N/10 bromine is equivalent to 0·005803 gramme of $C_6H_5O_4SNa,2H_2O$.

Action and Uses.—The phenolsulphonates resemble phenol in their action, but are very much less poisonous. Sodium phenolsulphonate diminishes putrefaction in the alimentary canal; it is absorbed and excreted in the urine unchanged. It is employed in cases of gastric flatulence and fermentative dyspepsia, and is best **administered** in solution in mixture form.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

SODII PHOSPHAS

(Sod. Phosph.)

Sodium Phosphate

$Na_2HPO_4,12H_2O = 358·2$

Synonym—Di-sodium Hydrogen Phosphate.

Sodium phosphate may be obtained by the interaction of sodium carbonate and the solution of calcium acid phosphate produced on mixing bone-ash and sulphuric acid. Crystallisation is conducted below 35° in order to avoid deposition of the dihydrate, $Na_2HPO_4,2H_2O$. It occurs as large, colourless, odourless, transparent, rhombic prisms, having a cooling, saline taste. The crystals are efflorescent in dry air, gradually losing 5 molecules of water of crystallisation. The aqueous solution is alkaline to bromocresol green. When heated to 40° the salt fuses, at 100° it loses its water of crystallisation, and at a dull red heat it is converted into the pyrophosphate, $Na_4P_2O_7$. When a solution of sodium phosphate is treated with an equimolecular proportion of sodium hydroxide and the solution evaporated, crystals of tribasic sodium phosphate, $Na_3PO_4,12H_2O$, are obtained.

Soluble in water (1 in 7); almost insoluble in alcohol (90 per cent.).

Standard, B.P.—Sodium phosphate contains not less than 99 per cent. and not more than the equivalent of 105 per cent. of Na_2HPO_4, $12H_2O$. Arsenic limit, 5 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for calcium and magnesium, chloride and sulphate.

Action and Uses.—Sodium phosphate is a saline cathartic, resembling in its mode of action other salines of a similar nature. Owing to its comparative tastelessness it is used as an aperient for children, and also in some forms of children's diarrhœa. It may be given in milk or soup, or mixed with food. A small proportion of the salt is absorbed and exerts a mild diuretic action and is used as an "antilithic" in gout. Sodium phosphate is **administered** in solution in mixture form, or as

Sodii Phosphas Effervescens. The exsiccated salt is preferable to the crystalline salt for dispensing in bulk with other salts or in weighed powders.

Dose.– 2 to 16 grammes ($\frac{1}{2}$ to 4 drachms).

SODII PYROPHOSPHAS.—Sodium pyrophosphate, $Na_4P_2O_7,10H_2O$, may be prepared by exposing crystallised sodium phosphate to warm, dry air until it has effloresced and then heating the residue to dull redness. The product is dissolved in water and crystallised. It occurs in the form of colourless, odourless, transparent, monoclinic prisms or as a crystalline powder. On heating to 100° it loses its water of crystallisation. It is soluble in boiling water (1 in 1·1) and insoluble in alcohol. Sodium pyrophosphate is used only in the preparation of metallic pyrophosphates.

SODII PYROPHOSPHAS ACIDUS.—Sodium acid pyrophosphate is prepared by heating sodium acid phosphate, and occurs in commerce as the anhydrous compound, $Na_2H_2P_2O_7$, which is a white, amorphous powder. It is very soluble in water, the solution being neutral to methyl orange and acid to phenolphthalein. Sodium acid pyrophosphate is used in the manufacture of certain baking powders.

Preparation

Sodii Phosphas Effervescens, B.P.—(Sod. Phosph. Efferv.)—Effervescent Sodium Phosphate. It contains the equivalent of about 50 per cent. of sodium phosphate. It should be stored in well-closed containers. Dose.– 4 to 16 grammes (1 to 4 drachms).

SODII PHOSPHAS ACIDUS

(Sod. Phosph. Acid.)

Sodium Acid Phosphate

$NaH_2PO_4,2H_2O = 156·1$

Synonyms—Sodium Di-hydrogen Phosphate; Sodium Biphosphate.

Sodium acid phosphate may be prepared by combining sodium phosphate in hot solution with an equimolecular proportion of phosphoric acid. The resulting solution is concentrated, cooled and allowed to crystallise. It occurs as colourless, odourless crystals or as a crystalline powder, having an acid, saline taste. When heated at 100° it loses all its water of crystallisation. It melts at about 204° and decomposes, forming sodium acid pyrophosphate, $Na_2H_2P_2O_7$, and at about 250° it yields sodium metaphosphate, $NaPO_3$. The aqueous solution is neutral to bromocresol green and acid to phenolphthalein.

Soluble in water (about 1 in 1), almost insoluble in alcohol (90 per cent.).

Standard, B.P.—Sodium acid phosphate contains not less than 98 per cent. of $NaH_2PO_4,2H_2O$. Arsenic limit, 5 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for di-sodium phosphate, calcium and magnesium, chloride and sulphate.

Action and Uses.—Sodium acid phosphate is employed to render

the urine acid and is frequently combined wth hexamine in the treatment of urinary infections and after operations on the bladder. Small repeated doses are preferred; they are less likely to set up diarrhœa and they produce a continuous excretion of the acid salt. It is **administered** in dilute, aqueous solution. For producing a general acidosis, ammonium chloride in 60 grain doses is more effective than sodium acid phosphate.

Dose.– 2 to 4 grammes ($\frac{1}{2}$ to 1 drachm).

SODII PHOSPHAS EXSICCATUS

(Sod. Phosph. Exsic.)

Exsiccated Sodium Phosphate

Synonym—Anhydrous Sodium Phosphate.

Exsiccated sodium phosphate may be prepared by allowing sodium phosphate to effloresce for several days in warm air at a moderate temperature, further drying at 100° and maintaining it at that temperature until it ceases to lose weight. It occurs as a white powder which readily absorbs moisture. It should be **stored** in well-stoppered bottles.

Soluble in water (1 in 15).

Standard.—Exsiccated sodium phosphate, determined by the method of the British Pharmacopœia for Sodii Phosphas, contains not less than 99 per cent. of Na_2HPO_4, calculated on the substance dried at 100°; each millilitre of N/2 sulphuric acid is equivalent to 0·07101 gramme of Na_2HPO_4. Loss on drying at 100°, not more than 2 per cent. Arsenic limit, 10 parts per million. Lead limit, 10 parts per million. It complies also with the limit tests for chlorides, sulphates and calcium and magnesium in Sodii Phosphas, using two-fifths the weight of substance for each test.

Action and Uses.—Exsiccated sodium phosphate has the same action as the crystalline salt. It is used for preparing effervescing granules or powders and in certain preparations where it would be disadvantageous to use the ordinary salt.

Dose.– 0·6 to 5 grammes (10 to 75 grains).

SODII SALICYLAS

(Sod. Salicyl.)

Sodium Salicylate

$C_7H_5O_3Na = 160·0$

Sodium salicylate, or sodium *o*-hydroxybenzoate, $C_6H_4(OH)·COONa$, may be obtained by the interaction of salicylic acid and sodium

carbonate. It is sometimes described as "physiologically pure." A variety is also obtainable known as "natural" sodium salicylate and is prepared by neutralising "natural" salicylic acid with sodium hydroxide or carbonate. Sodium salicylate occurs in small, colourless crystals or crystalline flakes or as a white powder. The synthetic variety is odourless, but the "natural" compound has a faint, aromatic, characteristic odour. Sodium salicylate has an unpleasant, sweetish, saline taste. The saturated aqueous solution is liable to deposit crystals of a less soluble hydrated salt, $C_7H_5O_3Na,6H_2O$. An aqueous solution gives an intense violet colour on the addition of a trace of ferric chloride solution.

Soluble in water (1 in 1) and alcohol (90 per cent.) (about 1 in 6).

Standard, B.P.—Sodium salicylate contains not less than 99·5 per cent. of $C_7H_5O_3Na$, calculated on the substance dried at 110°. Loss on drying at 110°, not more than 1 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. Melting-point of the separated salicylic acid, 158° to 159°. It complies also with limit tests for free alkali or free acid, chloride and sulphate.

Action and Uses.—When taken internally sodium salicylate is absorbed very rapidly, circulating in the blood as such. It increases tissue break-down to a small extent and for twenty-four to forty-eight hours only, in spite of its administration being continued. The nitrogen (urea, uric acid, etc.), sulphates, phosphates, and chlorides in the urine are all increased, but the uric acid is increased out of proportion to the urea. It exerts a marked antipyretic action; about fifteen minutes after administration, dilatation of the skin vessels and some perspiration appear, followed by a fall in temperature. There is increased loss of heat so that the temperature falls in spite of the augmented metabolism. Salicylates have the power of cutting short an attack of acute rheumatism, their mode of action in this respect being unknown. They appear to produce a specific effect, since local application of volatile salicylates, such as methyl salicylate, or injection of soluble salicylates into the affected joints affords speedy relief. The salicylates are excreted as salicyluric acid (2-hydroxyhippuric acid), a compound of glycocoll with salicylic acid; it is a non-toxic substance and has none of the specific effects of the salicylates on acute rheumatism. Sodium salicylate is largely employed in acute rheumatism, and 1·25 grammes (20 grains) may be given every three hours until the temperature is reduced; the dose may be increased to 16 grammes (240 grains) daily, and in very severe cases 25 grammes (400 grains) daily have been given; large doses are given with twice as much sodium bicarbonate. It is more rarely employed as an antipyretic in pneumonia, typhoid fever and other pyrexias, and is given also in influenza, acute tonsillitis, chronic rheumatism, sciatica and all neuralgias of rheumatic origin. It exerts some antiseptic action in the stomach and arrests gastric fermentation; it is so rapidly absorbed, however, that it is useless as an intestinal antiseptic and a less soluble form, such as salol, is therefore preferred.

Sodium salicylate exerts a mild cholagogue action and is of value in hepatic and gall-bladder infections.

Some individuals exhibit an idiosyncrasy to salicylates, but everyone is liable to certain objectionable symptoms after large doses. These are headache, noises in the ears, confusion, indistinctness of vision, excessive sweating, skin eruptions, dyspnœa and a condition of collapse with subnormal temperature, weak pulse and unconsciousness. Gastro-intestinal disturbances are an indication for the temporary withholding of the drug. Salicylates must be used with care when there is renal inflammation.

Sodium salicylate is **administered** in solution in mixture form, when its taste may be disguised with tincture of orange or infusion of clove. It may be injected hypodermically at the seat of pain in doses of 0·06 to 0·1 gramme (1 to 1½ grains). Solutions of 20 per cent. or 40 per cent. have been used as sclerosing injections for varicose veins. Great care is required in the use of sodium salicylate for this purpose since any solution which escapes into the surrounding tissues may give rise to sloughing. A solution of sodium salicylate is used for ionic medication in obstinate cases of fibrositis. When prescribed with alkali bicarbonates or with ammonium carbonate, the solution gradually acquires a reddish-brown colour; if the prescriber will authorise the addition, this change may be retarded by the addition of 1 grain of sodium pyrosulphite to an eight ounce mixture. Sodium salicylate forms a deep reddish-brown solution with spirit of nitrous ether, and a deep purple solution with iron salts; it is **incompatible** with acids and with solutions of some alkaloids. Mixtures containing quinine salts or cinchona preparations with sodium salicylate should contain no added acid; the alkaloidal salt in powder or the tincture or liquid extract of cinchona should be mixed with water containing one-eighth of its bulk of mucilage of acacia and the salicylate added in dilute solution. A solution of sodium salicylate for **injection** may be sterilised by tyndallisation or by filtration, and the containers should comply with the tests for limit of alkalinity of glass.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

SODII SILICOFLUORIDUM

(Sod. Silicofluor.)

Sodium Silicofluoride

$Na_2SiF_6 = 188·1$

Synonyms—Sodium Fluosilicate; Sodium Silicifluoride.

Sodium silicofluoride may be prepared by neutralising an aqueous solution of hydrofluosilicic acid with a solution of sodium carbonate, or by adding hydrofluosilicic acid to a saturated solution of pure sodium chloride, washing the gelatinous precipitate of sodium silicofluoride thus obtained with distilled water, and thoroughly drying. It occurs in

the form of a fine, white, granular or crystalline powder, which is odourless, non-volatile, non-deliquescent, and gelatinous when moist. On cooling the boiling saturated solution, the salt is deposited in small, regular, hexagonal prisms. It melts at a red heat, giving off silicon tetrafluoride, SiF_4. The aqueous solution is usually turbid and always acid in reaction. The corresponding acid does not attack glass.

Soluble in water (about 1 in 200) and boiling water (about 1 in 40); insoluble in alcohol.

Action and Uses.—Sodium silicofluoride in very dilute solution (1 in 500) has been used as an antiseptic, in which dilution it is non-caustic and non-poisonous. In concentrated solution it attacks surgical instruments and the enamel of porcelain.

SODII SULPHAS

(Sod. Sulph.)

Sodium Sulphate

$Na_2SO_4,10H_2O = 322{\cdot}2$

Synonym—Glauber's Salt.

Sodium sulphate is obtained as a by-product in the manufacture of nitric and hydrochloric acids by heating the corresponding sodium salts with sulphuric acid. Large quantities are produced from the mineral deposits at Stassfurt by double decomposition between sodium chloride and mineral residues containing magnesium sulphate. It occurs in the form of colourless, odourless crystals, having a bitter, saline taste. It rapidly effloresces in dry air, forming the anhydrous salt. When heated to about 33°, the crystals liquefy owing to decomposition of the decahydrate into the anhydrous salt and water, which forms a saturated solution. The anhydrous salt fuses at a red heat without decomposition. Sodium sulphate readily forms a supersaturated solution when a saturated solution prepared above 33° is cooled.

Soluble in water (1 in 3 at 15°, or 3 in 1 at 33°), at higher temperatures the solubility decreases to 2 in 1 at 100°; insoluble in alcohol (90 per cent.).

Standard, B.P.—Sodium sulphate contains not less than 99 per cent. and not more than the equivalent of 102 per cent. of $Na_2SO_4,10H_2O$. Loss on drying at 100°, not less than 55 per cent. and not more than 56·35 per cent. Arsenic limit, 2 parts per million. Lead limit, 5 parts per million. It complies also with limit tests for acidity or alkalinity, iron and zinc, magnesium and chloride.

Action and Uses.—Sodium sulphate is not absorbed to any considerable extent and it therefore possesses the property, incidental to solutions of non-absorbable salts, of abstracting liquid from the tissues of the intestinal walls and acting as a saline cathartic. These saline

cathartics are best given in dilute solution except when it is desired, as in dropsical conditions, to abstract as much water from the tissues as possible, in which case concentrated solutions should be used. The presence of the salts in solution promotes this abstraction, and the large bulk of liquid in the intestine sets up reflex peristalsis without producing irritation. Sodium sulphate and the other saline cathartics are much employed in habitual constipation due to deficient peristalsis, the best results being obtained by taking the dose, well diluted, early in the morning on an empty stomach. Its action is rapid and is unaccompanied by pain or griping. It is used to lessen intestinal putrefaction by clearing out the contents of the bowels, and is also of service in some forms of obesity. Repeated doses of 4 grammes (60 grains) are given for bacillary dysentery. Sodium bicarbonate may usefully be given with sodium sulphate; the mixture closely resembles "Carlsbad salt" and is especially used in constipation associated with gouty or hepatic disorder. A small percentage of sulphate is absorbed and excites the kidney to increased secretion. Many aromatic substances are excreted in combination with sulphates, and where an excess of such bodies finds its way into the blood, either from excessive putrefaction in the alimentary canal or in poisoning by phenol and allied bodies, the administration of sulphates is required.

Sodium sulphate is **administered** in mixture form or as Sodii Sulphas Effervescens. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. The dried salt may be prescribed in powders, mixed with sodium bicarbonate and ginger, if so desired. The powdered crystalline salt forms a damp mass with sodium bicarbonate after being mixed for some hours. An effective freezing mixture is formed by adding to the crystals half their weight of strong hydrochloric acid, the temperature produced being the same as that of a mixture of ice and salt (−18°).

Dose.– 2 to 16 grammes (½ to 4 drachms).

SODII SULPHAS ACIDUS.—Sodium acid sulphate, $NaHSO_4,H_2O$, or sodium bisulphate, occurs in crystals or fused masses. It is readily soluble in water and the solution has an acid reaction. Sodium acid sulphate is used with sodium bicarbonate for effervescing baths, and has been used for sterilising drinking water.

Preparations

Sal Carolinum Factitium, B.P.C.—(Sal Carol. Fact.)—Artificial Carlsbad Salt. It contains sodium sulphate, potassium sulphate, sodium carbonate and sodium chloride; 1½ drachms is approximately equivalent to 1 pint of the natural water. Dose.– 2 to 6 grammes (½ to 1½ drachms).

Sal Carolinum Factitium Effervescens, B.P.C.—(Sal. Carol. Fact. Efferv.)—Effervescent Artificial Carlsbad Salt. *Syn.*—Effervescent Carlsbad Powder. An effervescing powder containing about 1 in 10 of exsiccated sodium sulphate and about 1 in 2½ of sodium potassium tartrate, with sodium chloride, sodium bicarbonate, saccharin and tartaric acid. Dose.– 4 to 8 grammes (1 to 2 drachms).

Sodii Sulphas Effervescens, B.P.—(Sod. Sulph. Efferv.)—Effervescent Sodium Sulphate. It contains the equivalent of about 50 per cent. of sodium sulphate. It should be stored in well-closed containers. Dose.– 4 to 16 grammes (1 to 4 drachms).

SODII SULPHAS EXSICCATUS

(Sod. Sulph. Exsic.)

Exsiccated Sodium Sulphate

$Na_2SO_4 = 142{\cdot}1$

Synonyms—Anhydrous Sodium Sulphate; Exsiccated Glauber's Salt.

Exsiccated sodium sulphate may be prepared by drying sodium sulphate at 100° until it ceases to lose weight. It occurs as a white powder which readily absorbs moisture. It should be **stored** in well-stoppered bottles.

Soluble in water (1 in 8).

Standard.—Exsiccated sodium sulphate, determined by the method of the British Pharmacopœia for Sodii Sulphas, contains not less than 99 per cent. of Na_2SO_4, calculated on the salt dried at 100°; each gramme of residue is equivalent to 0·6086 gramme of Na_2SO_4. Loss on drying at 100°, not more than 5 per cent. Arsenic limit, 4 parts per million. Lead limit, 10 parts per million. It complies also with the limit tests for chlorides, iron and zinc, and magnesium in Sodii Sulphas, using half the weight of substance for each test.

Action and Uses.—Exsiccated sodium sulphate has the same action as the crystalline salt. It is used for preparing effervescing granules and powders, and for powders and certain other preparations for which the powdered crystals of sodium sulphate are not suitable.

Dose.– 1 to 8 grammes ($\frac{1}{4}$ to 2 drachms).

SODII SULPHIS

(Sod. Sulphis)

Sodium Sulphite

$Na_2SO_3,7H_2O = 252{\cdot}2$

Sodium sulphite may be prepared by the interaction of sulphurous acid and sodium carbonate. It occurs in colourless, odourless, transparent, monoclinic prisms, having a saline, sulphurous taste. It is efflorescent in air, becoming opaque and slowly oxidised to sulphate. Its aqueous solution is neutral or faintly alkaline to litmus and is more rapidly oxidised than the solid salt. On boiling a cold, saturated, aqueous solution, the anhydrous salt separates out as a crystalline powder which redissolves on cooling. On gently heating, the salt softens but does not fuse; above 100°, the crystals lose their water of crystallisation (practically 50 per cent.) without melting or losing their shape; at a red heat the salt fuses, yielding an orange-red mixture of sodium sulphide and sodium sulphate.

Soluble in water (1 in 2) and glycerin (1 in 25); insoluble in alcohol.

Standard.—Sodium sulphite contains not less than 94 per cent. of $Na_2SO_3,7H_2O$. Arsenic limit, 5 parts per million. 10 millilitres of an aqueous solution (1 in 10) is not rendered turbid on the addition of hydrochloric acid (limit of thiosulphate).

Assay.—Dissolve about 0·5 gramme, accurately weighed, in 50 millilitres of N/10 iodine and titrate the excess of iodine with N/10 sodium thiosulphate, using starch mucilage as indicator; each millilitre of N/10 iodine is equivalent to 0·01261 gramme of $Na_2SO_3,7H_2O$.

Action and Uses.—Sodium sulphite is an antiseptic, and in the presence of free acids sulphur dioxide is liberated (see Acidum Sulphurosum). Sulphites are also employed as food preservatives and they appear to be much less harmful than boric acid. A solution in glycerin and water (1 in 8) is used as a paint in aphthous conditions of the mouth and a 5 per cent. solution is used as a lotion in parasitic skin diseases. It is given internally in gastric fermentation due to yeasts and sarcinæ and is best **administered** in solution in mixture form. It is **incompatible** with acids. Sodium sulphite is used largely as a reducing agent in the arts.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

POTASSII PYROSULPHIS.—Potassium pyrosulphite, potassium metabisulphite or potassium bisulphite, $K_2S_2O_5$, may be prepared by passing sulphur dioxide to saturation into a solution of caustic potash or potassium carbonate. It is used as a reducing agent in photography and, in small quantities, for preventing discolouration in certain ointments, especially those containing resorcinol.

SODII PYROSULPHIS.—Sodium pyrosulphite, sodium metabisulphite, or sodium bisulphite, $Na_2S_2O_5$, may be prepared by passing sulphur dioxide to saturation into a solution of caustic soda or sodium carbonate. As the solution cools, crystals are deposited. It occurs in the form of opaque, prismatic crystals or as a white, amorphous powder, having an unpleasant, sulphurous, saline taste. It is liable to deteriorate when kept under unfavourable conditions and should be stored in well-closed containers in a cool place. On exposure to air and moisture, it becomes slowly oxidised to sulphate. It dissolves sulphur, forming sodium thiosulphate and also the haloid salts of silver. When heated, it decrepitates and gives off sulphur dioxide and sulphur, leaving a residue of sodium sulphate. It is a powerful reducing agent owing to the facility with which it passes into sodium sulphate. It is readily soluble in water and in boiling water (about 1 in 2). Sodium pyrosulphite is used as a reducing agent, and as a reagent for the preparation of organic sulphite compounds. It is also used largely as a food preservative (see Acidum Sulphurosum).

SODII TAUROGLYCOCHOLAS

(Sod. Tauroglycochol.)

Sodium Tauroglycocholate

Synonym—Bile Salts.

Sodium tauroglycocholate consists chiefly of a mixture of sodium taurocholate, $C_{26}H_{44}O_7NSNa$, and sodium glycocholate, $C_{26}H_{42}O_6NNa$.

It may be prepared by extracting dried ox or pig bile with dehydrated alcohol, decolourising with charcoal and precipitating the salts from the solution by adding an excess of ether. It occurs as a yellowish-brown, hygroscopic powder, having a sweet but afterwards bitter taste, and an odour resembling that of fresh bile. The aqueous solution froths when shaken and possesses the power of dissolving fatty acids. The solution is precipitated by lead acetate, ferric chloride, or silver nitrate. On hydrolysis with alkali these salts are split up into cholic acid and taurine and glycerin respectively. On adding concentrated sulphuric acid drop by drop to an aqueous solution in which a small crystal of cane sugar has been dissolved or to which a trace of furfural has been added, a brownish-red colour is formed changing to violet and becoming blue on keeping. Sodium tauroglycocholate is often erroneously termed sodium "taurocholate" or sometimes "choleate." Sodium tauroglycocholate should be **stored** in a cool place protected from moisture, but preferably not in stoppered bottles.

Soluble in water (2 in 1) and alcohol; insoluble in ether.

Standard.—Sodium tauroglycocholate yields not less than 16 per cent. of sulphated ash.

Action and Uses.—Sodium tauroglycocholate is given in cases of supposed deficiency of biliary secretion to assist emulsification of fats and as a purgative. It is a true cholagogue, and is of service in some forms of intestinal dyspepsia since it assists pancreatic digestion. It is of value in facilitating the action of some purgatives and in forming emulsions. Sodium tauroglycocholate is best **administered** in capsules. It is a constituent of some bacteriological culture media; the sodium salts of taurocholic and glycocholic acids, while having some lytic action on pneumococci, have only a fraction of that possessed by desoxycholic acid and its salts, and therefore sodium tauroglycocholate is not suitable for use in the identification of pneumococci. A mixture containing 1 per cent. of sodium tauroglycocholate with 5 per cent. of oil of eucalyptus in water is used for the destruction of pediculi.

Dose.– 0·12 to 0·4 gramme (2 to 6 grains).

SODII DESOXYCHOLAS.—Sodium desoxycholate, or sodium deoxycholate, $C_{24}H_{39}O_4Na$, may be prepared by hydrolysing sodium tauroglycocholate with alkali and crystallising the bile acids, separating on acidification, from glacial acetic acid. Desoxycholic acid separates in colourless crystals. Sodium desoxycholate occurs as a white powder, readily soluble in water. It is extremely irritating when inhaled.

SODII GLYCOCHOLAS.—Sodium glycocholate, $C_{26}H_{42}O_6NNa$, may be prepared from sodium tauroglycocholate by precipitating with lead acetate and decomposing the precipitate suspended in alcohol with hydrogen sulphide. Glycocholic acid is set free and may be converted into the sodium salt by neutralisation with sodium hydroxide.

SODII TAUROCHOLAS.—Sodium taurocholate, $C_{26}H_{44}O_7NSNa$, is obtained from the filtrate from the lead acetate precipitation of sodium tauroglycocholate and may be purified by precipitation with basic lead acetate. The free acid is liberated from its lead salt and neutralised with sodium hydroxide.

SODII THIOSULPHAS

(Sod. Thiosulph.)

Sodium Thiosulphate

$Na_2S_2O_3,5H_2O = 248{\cdot}2$

Synonym—Sodium Hyposulphite.

Sodium thiosulphate may be prepared by boiling a solution of sodium sulphite with powdered roll sulphur, filtering, and evaporating the solution to crystallisation, or, on the large scale, by exposing soda-waste to air, thereby converting the calcium sulphite contained in it into calcium thiosulphate, and decomposing the latter by means of sodium carbonate or sulphate, separating the insoluble lime salt formed and recovering the sodium thiosulphate from the solution by filtration, evaporation and crystallisation. Gas-lime treated in a similar way is also used for its manufacture. Sodium thiosulphate occurs in the form of colourless, odourless, transparent, monoclinic prisms, having a cooling and afterwards bitter, slightly alkaline and sulphurous taste. The crystals are somewhat damp to the touch; they are slightly deliquescent in moist air and efflorescent in dry air above 33°. On boiling, the aqueous solution is rapidly decomposed. When rapidly heated, sodium thiosulphate melts in its water of crystallisation at 50°, at 100° it loses all its water of crystallisation and at a red heat it is decomposed with liberation of sulphur, leaving a residue of sodium sulphide and sulphate. It also loses its water of crystallisation over sulphuric acid. On acidifying the aqueous solution, it is decomposed with the production of sulphurous acid and sulphur, the latter forming a white precipitate (distinction from sulphites).

Soluble in water (5 in 3); slightly soluble in oil of turpentine; insoluble in alcohol.

Standard.—Sodium thiosulphate contains not less than 99 per cent. of $Na_2S_2O_3,5H_2O$. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. The 10 per cent. w/v aqueous solution is neutral or not more than faintly alkaline to litmus. 0·5 gramme dissolved in 10 millilitres of water produces no turbidity with ammonium oxalate solution (limit of calcium).

Assay.—Dissolve about 1 gramme, accurately weighed, in water and titrate with N/10 iodine, using starch mucilage as indicator; each millilitre of N/10 iodine is equivalent to 0·02482 gramme of $Na_2S_2O_3$, $5H_2O$.

Action and Uses.—Sodium thiosulphate has been recommended for internal use similar to that of sodium sulphite, but is rarely so employed. A solution in sterilised water, 0·3 to 0·9 gramme in 10 millilitres (5 to 14 grains in 150 minims), is administered by intravenous injection as an antidote in cases of over-dosage of arsphenamine compounds and salts of bismuth, mercury and gold. After extravenous leakage of arsphenamine compounds the area should be infiltrated immediately

with a sterile solution of sodium thiosulphate. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration. Sodium thiosulphate is extensively used in photography on account of its property of forming double salts with silver. In fixing photographic prints it acts by dissolving the unaltered portion of the sensitive film, forming soluble double salts with the silver chloride, bromide, or iodide. A strong solution in water has been used in gas-masks to absorb chlorine, and as an "antichlor" it is used for removing the chlorine remaining after bleaching operations.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

MAGNESII THIOSULPHAS.—Magnesium thiosulphate, $MgS_2O_3,6H_2O$, may be prepared by the interaction of barium thiosulphate and magnesium sulphate. It occurs as colourless, odourless crystals which effloresce in dry air. It is soluble in water (1 in 1·5), the solution being slightly alkaline to litmus, but insoluble in alcohol. Magnesium thiosulphate has been used in the treatment of asthma. It is administered by intramuscular injection in doses of 5 to 10 millilitres of a 10 per cent. solution at intervals of four days, and by the mouth in doses of 1 gramme (15 grains) three times a day.

SODII VALERIANAS

(Sod. Valer.)

Sodium Valerianate

$C_5H_9O_2Na = 124·1$

Synonym—Sodium Valerate.

Sodium valerianate may be prepared by neutralising valerianic acid with a solution of sodium hydroxide, evaporating the solution to dryness, heating the saline residue carefully until it melts, and breaking up the cooled mass into small fragments. The salt is difficult to crystallise from water, but by evaporation of the neutral solution in dry air at 32° crystals may be obtained. It occurs in the form of white, hygroscopic masses, unctuous or soapy to the touch, having a neutral or slightly alkaline reaction, a weak odour of valerian when quite dry, more pronounced when moistened and warmed, and a sweetish taste with a somewhat bitter and pungent after-taste. When heated at 140°, it melts without decomposition to a colourless liquid and on cooling it solidifies with a crystalline structure; at a higher temperature it gives off pungent, acid vapours and inflammable gas, and on complete ignition it leaves a residue of sodium carbonate. When a concentrated solution is acidified, valerianic acid separates as an oily layer on the surface of the liquid. It should be **stored** in well-stoppered bottles.

Freely **soluble** in water and alcohol.

Standard.—Sodium valerianate, determined by the method of the British Pharmacopœia for Sodii Salicylas, contains not less than 85 per cent. of $C_5H_9O_2Na$; each millilitre of N/2 sulphuric acid is equivalent to

0·06203 gramme of $C_5H_9O_2Na$. Arsenic limit, 5 parts per million. Lead limit, 10 parts per million. 1 gramme complies with the limit test for sulphates. 1 gramme dissolved in water requires not more than 1 millilitre of N/10 sodium hydroxide for neutralisation to phenolphthalein (limit of free acid).

Action and Uses.—Sodium valerianate resembles other valerianates in its action and is used for its psychical effect in hysteria and other nervous disorders. In other respects its action is similar to that of sodium acetate. It is sometimes **administered** in pills with zinc and iron valerianates, or in solution in mixture form with ammonium valerianate or aromatic spirit of ammonia. It is **incompatible** with acids.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

SOJA
(Soja)
Soya

Synonyms—Sojæ Semina; Soy Beans; Soya Beans.

Soya consists of the seeds of *Glycine Soja* Sieb. and Zucc. (Fam. Leguminosæ), an annual plant cultivated in China, Japan, India, Manchuria, America and the Dutch East Indies.

The seeds are usually pale yellow in colour although brown or black varieties also occur. They are roundly ovoid in shape, measuring on the average 8 millimetres long, 7 millimetres wide and 6 millimetres thick. The hilum is 3 to 4 millimetres long and is found in the middle of one of the longer edges of the seed. The leathery and somewhat translucent seed coat surrounds two plano-convex cotyledons which enclose a small radicle and plumule. The seeds are without odour, and the taste is bland and oily.

The chief diagnostic **microscopical** characters are the palisade cells of the seed coat epidermis up to 50 microns high and 20 microns wide; the single row of thick-walled bearer cells varying in length from 40 to 120 microns and in width from 20 to 35 microns; the cells of the cotyledons filled with closely packed aleurone grains, 3 to 11 microns wide, and droplets of fixed oil; the occasional cells containing prismatic crystals of calcium oxalate about 25 microns long and 5 microns wide. Starch is absent.

Soya **contains** fixed oil (about 18 per cent.), proteins (about 40 per cent.), carbohydrates (about 22 per cent.), and the enzyme, urease. The proteins are remarkable on account of the large proportion soluble in water. The ash is about 5 per cent.

Uses.—Soya is used chiefly for the production of soya oil. It is sometimes used in the manufacture of food products, and soya cake is

used as a fertiliser and for cattle food. Soya is also used for the determination of urea.

UREASUM.—Urease is an enzyme, present in soya, which has the power of converting urea into ammonium carbonate. It is extracted by means of dilute alcohol or acetone, and a partly purified form is sometimes used instead of soya in the determination of urea in blood and urine.

SPARTEINÆ SULPHAS

(Spart. Sulph.)

Sparteine Sulphate

$C_{15}H_{26}N_2,H_2SO_4,5H_2O = 422{\cdot}4$

Sparteine sulphate is a salt of the dibasic alkaloid, sparteine, and may be prepared by neutralising the colourless alkaloid, 10 parts, with dilute sulphuric acid, about 40 parts of 10 per cent. solution, rapidly concentrating the solution, and allowing to crystallise in a warm place. Under varying conditions it crystallises with different proportions of water, and may also be obtained in the form of an anhydrous salt, but by recrystallisation from diluted alcohol the salt containing five molecules of water of crystallisation is obtained. It occurs in the form of colourless, odourless, rhombohedral crystals or as a white, crystalline powder, having a slightly saline and bitter taste. The aqueous solution is neutral or slightly acid to methyl red. The 10 per cent. aqueous solution gives with sodium hydroxide a white precipitate which soon changes into oily drops and is soluble in ether and chloroform. On adding 25 millilitres of ether to about 0·1 gramme of the salt, then a few drops, but not an excess, of solution of ammonia, and afterwards an ethereal solution of iodine, 1 in 50, until the solution on shaking turns from orange to dark reddish-brown in colour, the sides of the vessel containing the solution become covered in a short time with minute, dark greenish-brown crystals. The specific rotation, determined on a 10 per cent. w/v solution of the hydrated salt and calculated for anhydrous sparteine sulphate, is about −27·6°.

Soluble in water (2 in 1) and alcohol (1 in 5); insoluble in ether and chloroform.

Standard.—Sparteine sulphate, after drying at 115°, does not melt below 150°. Loss on drying at 110°, not less than 20 per cent. and not more than 22 per cent. Ash, not more than 0·1 per cent.

Action and Uses.—Sparteine resembles coniine in its general effects, but it is very much less poisonous. It has little action on the central nervous system, but large doses paralyse sympathetic nerve cells and the peripheral terminations of the motor nerves. Depression of autonomic nerve cells causes a fall in blood pressure with vasodilatation, and its employment has been recommended in cases of high blood pressure. It does, however, act as a cardiac depressant, the rhythm being slow and the contraction weak. Sparteine sulphate is the most

commonly used salt of the base and has been given in doses as large as 0·8 gramme (12 grains). It is **administered** in pills, or by hypodermic injection in doses of from 0·12 to 0·4 millilitre (2 to 6 minims) of a 15 per cent. solution. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration, and the containers should comply with the tests for limit of alkalinity of glass.

Dose.– 0·06 to 0·12 gramme (1 to 2 grains).

SPARTEINA.—Sparteine, $C_{15}H_{26}N_2$, is a volatile, liquid alkaloid obtained from scoparium. It occurs as a transparent, oily liquid, colourless when freshly prepared, but absorbing oxygen under the influence of air and light and becoming yellowish to dark brown in colour, and thicker; it is heavier than water, and has a penetrating odour resembling that of aniline and an intensely bitter taste. The aqueous solution is strongly alkaline. It is sparingly soluble in water, soluble in alcohol, ether and chloroform, but insoluble in benzene and petroleum oils.

SPIRITUS METHYLATUS INDUSTRIALIS

(Sp. Meth. Indust.)

Industrial Methylated Spirit

Synonym—Industrial Methylated Spirits.

Industrial methylated spirit is a mixture made by a legally authorised methylator of 19 volumes of alcohol (95 per cent.) with 1 volume of approved wood naphtha, and is of the quality known as "66 O.P. Industrial Methylated Spirits". It is a colourless, transparent, mobile and volatile liquid with a burning taste and an odour of alcohol and of wood naphtha. 0·5 millilitre diluted with water to 5 millilitres and tested for methyl alcohol as described in the British Pharmacopœia gives an intensely violet-coloured solution. This spirit is also obtainable in other strengths, one of the most common being "64 O.P. Industrial Methylated Spirits".

Standard, B.P.—Industrial methylated spirit has a specific gravity not higher than 0·817. Residue on evaporation and drying at 100°, not more than 0·01 per cent. w/v. It complies also with limit tests for acidity, alkalinity and for oily and resinous substances.

Uses.—Industrial methylated spirit is now widely used in pharmacy. The Board of Customs and Excise permit, subject to the observance of the conditions laid down in their regulations, the use of industrial duty-free spirit in the preparation of a range of specified preparations intended for external use only. These scheduled preparations include certain inhalations, liniments, lotions, parogens, sprays, spirits, solutions and tinctures of the British Pharmacopœia or British Pharmaceutical Codex, in addition to a formulary of medicinal, surgical, toilet and other preparations. Industrial methylated spirit may also be used in the preparation of certain extracts, resins and surgical dressings, provided that in each case no alcohol remains in the finished product. Provisions governing the dispensing, on the prescriptions of qualified

medical, dental and veterinary practitioners, of industrial methylated spirit or preparations of which it is an ingredient and its utilisation in ways other than those mentioned, are also contained in the regulations issued by the Board of Customs and Excise. Industrial methylated spirit, as usually supplied, contains acetone and should not be used for the preparation of iodine solutions, since an irritating compound is formed by reaction between the iodine and acetone; for such preparations industrial methylated spirit (acetone-free) is used. In cases of **poisoning** by industrial methylated spirit or mineralised methylated spirit the procedure described under Alcohol Methylicum should be adopted.

Preparation

Spiritus Chirurgicalis, B.P.C.—(Sp. Chir.)—Surgical Spirit. No. 1 contains industrial methylated spirit with castor oil, 2·5 per cent., methyl salicylate and ethyl phthalate. No. 2 contains industrial methylated spirit with castor oil, 2·75 per cent., mineral naphtha and ethyl phthalate.

SPIRITUS METHYLATUS INDUSTRIALIS SINE ACETONO

(Sp. Meth. Indust. s. Aceton.)

Industrial Methylated Spirit (Acetone-free)

Industrial methylated spirit (acetone-free) is a mixture, made by a legally authorised methylator, of 19 volumes of alcohol (95 per cent.) with 1 volume of approved wood naphtha or other approved denaturant, and is of the quality known as "66 O.P. Industrial Methylated Spirits," but free from acetone. It is a colourless, transparent, mobile and volatile liquid, with a burning taste and an odour of alcohol and of wood naphtha. 0·5 millilitre diluted with water to 5 millilitres and tested for methyl alcohol as described in the British Pharmacopœia gives an intensely violet-coloured solution.

Standard.—Industrial methylated spirit (acetone-free) has a specific gravity not greater than 0·817. It complies with the limit tests for residue on evaporation and drying at 100°, acidity, alkalinity, and for oily and resinous substances in Spiritus Methylatus Industrialis. Dilute 5 millilitres with water to 10 millilitres and add 1 millilitre of 1 per cent. solution of *o*-nitrobenzaldehyde in alcohol (50 per cent.), followed by 1 millilitre of 15 per cent. w/v sodium hydroxide solution; the colour produced at the end of fifteen minutes is not greater than that produced by similarly treating 10 millilitres of 0·025 per cent. v/v solution of acetone in alcohol (50 per cent.) (limit of acetone).

Uses.—Industrial methylated spirit (acetone-free) is used in the preparation of iodine paint and other spirituous solutions of iodine intended for external use instead of ordinary industrial methylated spirit, the acetone content of which is very liable to produce irritating vapours when solutions of iodine are used over large areas, as in pre-operative work.

STAPHISAGRIA

(Staphisag.)

Staphisagria

Synonyms—Staphisagriæ Semina; Stavesacre Seeds.

Staphisagria consists of the seeds obtained from *Delphinium Staphisagria* Linn. (Fam. Ranunculaceæ), a herb indigenous to Asiatic Turkey and Southern Europe and cultivated in France and Italy.

The seeds, which are pointed at one end, are from 6 to 8 millimetres in length and breadth, obscurely four-sided and of irregular pyramidal shape, one side being distinctly arched and broader than the others, which are flattened. Usually they appear grey in colour, but when freed from the dust with which they are covered, are seen to be dark brown. The surface is coarsely reticulated and covered with minute papillæ. Near the pointed end the hilum can be seen as a narrow line. A vertical section passing through the hilum shows a minute embryo embedded in a large, yellowish-white, oily endosperm. The seed coats are tasteless, but the endosperm is bitter and acrid.

The diagnostic **microscopical** characters are the brown epidermal cells varying in size and shape, with strongly thickened walls characterised by ridges which project from the outer wall; the polygonal cells of the inner layer of the testa, exhibiting wrinkles which take the form of linear projections; the cells of the endosperm containing granular protein together with fixed oil.

Staphisagria **contains** about 1 per cent. of alkaloids, the most important of which are delphinine, $C_{34}H_{47}O_9N$, (rhombic crystals, which begin to decompose at 120°, before the melting-point is reached), delphisine and delphinoidine, with traces of staphisagroine. It also contains about 25 to 35 per cent. of fixed oil which, on expression, carries with it the greater part of the alkaloid. The ash varies from 10 to 15 per cent.

Action and Uses.—Staphisagria is used chiefly in the form of ointment and lotion to destroy pediculi. An ointment may also be prepared by mixing the fixed oil with seven parts of benzoinated lard. Delphinine resembles aconitine in its physiological action.

Preparations

Lotio Staphisagriæ, B.P.C.—(Lot. Staphisag.)—Stavesacre Lotion. *Syn.*—Nursery Hair Lotion. Stavesacre, 10 per cent. w/v, with acetic acid, alcohol (90 per cent.), glycerin and distilled water, perfumed with oils of geranium, lavender and lemon.

Unguentum Staphisagriæ, B.P.C.—(Ung. Staphisag.)—Stavesacre Ointment. A mixture of yellow beeswax and benzoinated lard in which stavesacre, about 20 per cent., has been digested.

This ointment was included in the British Pharmacopœia, 1914.

STILLINGIA
(Stilling.)
Stillingia

Synonyms—Queen's Root; Yaw Root.

Stillingia is the dried root of *Stillingia sylvatica* Linn. (Fam. Euphorbiaceæ), a perennial plant indigenous to the United States of America. Stillingia should not be **stored** for a longer period than two years after the date of collection.

The root occurs in slenderly fusiform or cylindrical pieces of various lengths, usually about 15 to 20 centimetres, and from 0·5 to 2 centimetres in thickness; occasionally very long, fibrous rootlets are attached. Externally, the root is reddish brown and finely or coarsely wrinkled longitudinally, the thicker pieces showing transverse cracks at intervals. It breaks with a fibrous fracture, the fractured surface being whitish in the bark and cinnamon-brown in the wood. The smoothed, transverse surface shows a wide, starchy bark containing numerous resin cells, and a central, porous wood which is easily separable from the bark. The drug has a characteristic odour and the taste is slightly bitter and acrid.

Stillingia **contains** sylvacrol (an acrid resin), fixed oil, volatile oil (3 to 4 per cent.), together with tannin, starch and calcium oxalate.

Standard.—Stillingia contains not more than 2 per cent. of foreign organic matter.

Action and Uses.—Stillingia, by virtue of its mildly irritant properties, acts reflexly as a sialagogue and expectorant. In large doses it has emetic and cathartic properties.

Dose.– 1 to 2 grammes (¼ to ½ drachm).

STRAMONII SEMEN
(Stramon. Sem.)
Stramonium Seed

Synonym—Thornapple Seed.

Stramonium seed consists of the seeds of *Datura Stramonium* Linn. (Fam. Solanaceæ), a bushy annual plant about three feet in height growing throughout the warmer temperate regions.

The seeds are flattened and reniform in shape, measuring about 3 millimetres in length, 2 millimetres in width and 1 millimetre in thickness. The hilum appears as a light spot on the concave edge. They vary in colour from purple to nearly black. The seed coat is finely pitted and shows a network of more or less well-marked, characteristic, reticulate depressions. A section cut parallel to the flat surface of the seed shows a whitish, curved embryo embedded in a

translucent, oily endosperm. The seeds have a scarcely perceptible odour, and the taste is somewhat bitter and oily.

The diagnostic **microscopical** characters are the large sclerenchymatous cells of the epidermis, not exceeding 350 microns in height, having dark-coloured walls and narrow lumina, but without pits in the basal walls, and the cells of the endosperm containing oil and aleurone grains which frequently show a distinct crystalloid and globoid.

Stramonium seed **contains** from about 0·1 to about 0·5 per cent. of alkaloid, the average being about 0·2 per cent., consisting chiefly of hyoscyamine associated with small quantities of atropine and hyoscine; it also contains from 15 to 30 per cent. of fixed oil; the latter has a specific gravity of about 0·919 and contains daturic and other acids. The ash is about 5 per cent.

Action and Uses.—The properties of stramonium seed resemble those of stramonium leaf.

STRAMONIUM

(Stramon.)

Stramonium

Synonyms—Stramonii Folia; Stramonium Leaves; Thornapple Leaves.

Stramonium consists of the dried leaves and flowering tops of *Datura Stramonium* Linn. and of *D. tatula* Linn. (Fam. Solanaceæ), bushy annuals cultivated in England, Germany, Hungary and the United States of America. The leaves and young shoots are collected while the plant is in flower, from about June to September.

The leaves are dark greyish-green and much shrivelled and twisted as the result of drying; when expanded they are ovate or triangular-ovate in outline, with a sinuate-dentate margin, 8 to 25 centimetres long and 7 to 20 centimetres broad. The apex is acuminate and the base usually unequal. The petiole is often short and twisted. The young leaves bear numerous trichomes, but the older ones are almost glabrous. The stems are dichotomously branched. The flowers occur solitary at the forks and are about 7·5 centimetres long, erect and shortly pedicellate; the corolla is white or purplish-blue, plicate and funnel-shaped. The ovary is superior, conical, spuriously tetralocular in the lower part, and covered with short, stiff emergences. The odour is disagreeable and characteristic, and the taste is unpleasant and bitter.

The diagnostic **microscopical** characters are the smooth cuticle and wavy anticlinal walls of the epidermal cells; the stomata of the cruciferous type, rare in the upper epidermis, but numerous in the lower; straight or slightly curved, uniseriate, conical trichomes with thin, warty walls, usually 3-celled, the basal cell being the largest and usually exceeding 50 microns in length and 35 microns in breadth; the glandular trichomes which are usually curved and composed of a short 1- or 2-celled pedicel and a 2- to 7-celled glandular head; the single row of palisade

cells and, beneath it, the crystal layer containing in most of the cells a single cluster-crystal of calcium oxalate or occasional prisms or microsphenoidal crystals; the presence of perimedullary phloem in the midrib; the trichomes of the stem epidermis, resembling those of the leaf but often attaining a length of 800 microns; the occasional pericyclic fibres; the numerous wood fibres and vessels; the crystal sacs and perimedullary phloem of the stems.

Stramonium **contains** from 0·3 to 0·5 per cent. of alkaloid, which consists chiefly of hyoscyamine, associated with atropine and hyoscine.

Varieties.—The leaves and stems of *Datura Stramonium* are green in colour and the corollas of the flowers are white. The stems and petioles of *D. tatula* are tinted with red and the corollas are purplish-blue; the leaves are a somewhat darker green than those of *D. Stramonium*. Stramonium is sometimes imported in a broken (laminated) condition and is then not infrequently adulterated.

Substitutes.—The leaves of *Xanthium Strumarium* Linn. (Fam. Compositæ) have large, usually 3-celled, conical hairs containing cystoliths, and have no cluster-crystals of calcium oxalate. The leaves of *Carthamus helenioides* Desf. (Fam. Compositæ) have large epidermal cells with straight walls and striated cuticle, no cluster-crystals, and well-developed secreting ducts. Those of *Chenopodium hybridum* Linn. (Fam. Chenopodiaceæ) have small epidermal cells with nearly straight walls, and trichomes terminated by a large, bladdery, water-storing cell.

Standard, B.P.—Stramonium contains not more than 2 per cent. of foreign organic matter, not more than 20 per cent. of its stem, not more than 1 per cent. of its stem having a width greater than 4 millimetres and not less than 0·25 per cent. of the alkaloids of stramonium, calculated as hyoscyamine. Ash, not more than 20 per cent. Acid-insoluble ash, not more than 4 per cent.

Stramonium, in powder (Pulvis Stramonii : Pulv. Stramon.), contains the constituents and possesses the diagnostic microscopical characters of Stramonium, and complies with the standard for alkaloids, ash and acid-insoluble ash of the unground drug.

Action and Uses.—The properties of stramonium are virtually those of the alkaloid, hyoscyamine. The drug is used chiefly to relieve the spasmodic contractions of the bronchioles in asthma; it paralyses the peripheral ends of the vagi in the bronchioles, so that the latter relax. Stramonium, in doses of 2½ grains three times a day, increased to 15 or 20 grains daily, is used for the sequelæ of encephalitis lethargica. Definite improvement has been observed following the administration of large doses, but too rapid an increase of dosage may lead to paralysis of accommodation. The leaf is smoked in cigarettes and is an ingredient of Pulvis Stramonii Compositus and other powders intended to be burnt for asthma, but the use of such powders is not to be recommended owing to the vicious circle set up by the irritant fumes resulting from combustion. Stramonium is **administered** in pills or tablets, as Tinctura Stramonii in mixture form, often with tincture of lobelia and potassium iodide, or as extract or liquid extract. In cases of **poisoning** by stramonium the procedure described under Atropina should be followed.

Dose.– 0·03 to 0·2 gramme (½ to 3 grains).

Preparations

Extractum Stramonii, B.P.C.—(Ext. Stramon.)—Extract of Stramonium. This extract contains from 0·95 to 1·05 per cent. of the alkaloids of stramonium; 0·06 gramme contains about 0·0006 gramme, and 1 grain contains about $\frac{1}{160}$ grain, of alkaloids. Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

Extractum Stramonii Liquidum, B.P.C.—(Ext. Stramon. Liq.)—Liquid Extract of Stramonium. This liquid extract contains from 0·225 per cent. to 0·275 per cent. of the alkaloids of stramonium; 0·2 millilitre contains about 0·0005 gramme, and 3 minims contains about $\frac{1}{150}$ grain, of alkaloids. Dose.– 0·03 to 0·2 millilitre ($\frac{1}{2}$ to 3 minims).

Mistura Lobeliæ et Stramonii Composita, B.P.C.—(Mist. Lobel. et Stramon. Co.)—Compound Mixture of Lobelia and Stramonium. Each fluid ounce contains 4 grains of ammonium carbonate, 5 grains of potassium iodide and 10 minims each of ethereal tincture of lobelia and tincture of stramonium, in chloroform water. Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

Pulvis Lobeliæ Compositus, B.P.C.—(Pulv. Lobel. Co.)—Compound Lobelia Powder. Equal parts of lobelia, stramonium and tea, impregnated with potassium nitrate and oil of anise.

Pulvis Stramonii Compositus, B.P.C.—(Pulv. Stramon. Co.)—Compound Stramonium Powder. Stramonium, 1 in 2, with lobelia, anise and tea, impregnated with potassium nitrate and oil of eucalyptus.

Tinctura Stramonii, B.P.—(Tinct. Stramon.)—Tincture of Stramonium. It is prepared by percolation with alcohol (45 per cent.), and contains 0·025 per cent. w/v of the alkaloids of stramonium, calculated as hyoscyamine (limit, 0·0225 to 0·0275); 2 millilitres contains 0·0005 gramme, and 30 minims contains about $\frac{1}{160}$ grain, of alkaloids. It is approximately half the strength of the corresponding preparation of the British Pharmacopœia, 1914. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Unguentum Stramonii, B.P.C.—(Ung. Stramon.)—Stramonium Ointment. Extract of stramonium, 10 per cent., in hydrous wool fat and benzoinated lard.

STRONTII BROMIDUM

(Stront. Brom.)

Strontium Bromide

$SrBr_2,6H_2O = 355·6$

Strontium bromide may be prepared by treating diluted hydrobromic acid with a slight excess of strontium carbonate, filtering the mixture, and evaporating the filtrate until crystals begin to form. On cooling, the separated salt is collected and carefully dried at a moderate heat. It occurs in colourless, transparent, odourless crystals which are very deliquescent and have a bitter, saline, unpleasant, metallic taste. It is precipitated from an alcoholic solution on the addition of an equal volume of ether. The aqueous solution is neutral to litmus and deposits a crystalline precipitate on the addition of calcium sulphate solution. On heating, the salt first melts in its water of crystallisation and then becomes anhydrous at 120° to 130°. The anhydrous salt melts at about 630° without decomposition. It should be **stored** in well-closed containers.

Soluble in water (2 in 1) and alcohol (1 in 3); insoluble in ether.

Standard.—Strontium bromide, determined by the method of the British Pharmacopœia for Potassii Bromidum, contains not less than 97 per cent. of $SrBr_2,6H_2O$; each millilitre of N/10 silver nitrate is equivalent to 0·01778 gramme of $SrBr_2,6H_2O$. Arsenic limit, 5 parts per million. Lead limit, 20 parts per million. It complies with the limit tests for chloride and bromate in Potassii Bromidum. 2 grammes complies with the limit test for sulphates. 0·5 gramme complies with the limit test for iron. Dissolve 2 grammes in 10 millilitres of dilute acetic acid and add a few drops of potassium dichromate solution; no turbidity appears within three minutes (limit of barium).

Action and Uses.—Strontium salts are somewhat similar in action to calcium salts; they are absorbed very slowly from the intestine and are excreted chiefly by the bowel. Strontium bromide is sometimes used in place of potassium bromide and it is stated, erroneously, to be less depressing than the latter; it is also said to be less liable to produce a rash. Owing to its slower rate of absorption, it is not so useful in epilepsy as potassium bromide. It is **administered** in solution in mixture form. Strontium salts are **incompatible** with alkali carbonates and bicarbonates.

Dose.– 0·3 to 2 grammes (5 to 30 grains).

STRONTII IODIDUM

(Stront. Iod.)

Strontium Iodide

$SrI_2,6H_2O = 449·6$

Strontium iodide may be prepared by neutralising hydriodic acid with strontium carbonate, filtering the solution, concentrating and crystallising. It occurs in colourless, transparent, odourless plates or crystalline masses which are deliquescent and have a bitter, saline taste. When cautiously heated, the crystals melt and gradually lose their water of crystallisation; at a red heat, the salt is decomposed, losing iodine. An aqueous solution is neutral or faintly alkaline to litmus. It should be **stored** in well-closed containers.

Soluble in water (2 in 1) and alcohol; slightly soluble in ether.

Standard.—Strontium iodide, determined by the method of the British Pharmacopœia for Potassii Iodidum, contains not less than 99 per cent. of $SrI_2,6H_2O$; each millilitre of M/20 potassium iodate is equivalent to 0·02248 gramme of $SrI_2,6H_2O$. Arsenic limit, 2 parts per million. Lead limit, 20 parts per million. 2 grammes complies with the limit test for sulphates. Dissolve 2 grammes in 10 millilitres of dilute acetic acid and add a few drops of potassium dichromate solution; no turbidity appears within three minutes (limit of barium).

Action and Uses.—Strontium iodide possesses properties similar to those of the alkali iodides and has been used in chronic endocarditis, asthma and rheumatism.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

STROPHANTHINUM
(Strophanthin.)

Strophanthin

Synonyms—Kombé Strophanthin; K-Strophanthin.

Strophanthin is a mixture of glycosides obtained from *Strophanthus kombé*. It consists of cymarin, k-strophanthin-β, and other glycosides, and may be isolated from the freshly powdered seeds by extracting first with ether or carbon disulphide to remove fat and then with alcohol, the latter being distilled off, the residue dissolved in water and the solution filtered. The filtrate is treated with tannic acid and the washed precipitate mixed with lead oxide, dried, and extracted with alcohol. On adding excess of ether to the alcoholic solution, strophanthin is precipitated; it is collected, and dried *in vacuo*. Strophanthin is adjusted to the required standard by admixture with lactose. The undiluted mixture of glycosides occurs as a white or yellowish-white powder which may contain microcrystalline particles. The aqueous solution is neutral to litmus and is dextrorotatory. By decomposition with dilute mineral acids, strophanthin is hydrolysed into strophanthidin and a biose. Strophanthin may be distinguished from ouabain by dissolving a small quantity in a cold mixture of 4 volumes of sulphuric acid and 1 volume of water, when an emerald-green colouration is produced. Strophanthin should be **stored** in well-closed containers and protected from light.

Soluble in water and alcohol (90 per cent.); less soluble in dehydrated alcohol; sparingly soluble in chloroform; almost insoluble in ether, benzene and light petroleum.

Standard, B.P.—Strophanthin is adjusted by admixture with lactose so that it possesses an activity equal to 40 per cent. of that of the international standard ouabain. A standard preparation of strophanthin for use in Great Britain and Northern Ireland, of known potency compared with the international standard ouabain, is kept in the National Institute for Medical Research, London. Loss on drying in a vacuum desiccator over sulphuric acid, not more than 3 per cent. Ash, not more than 1 per cent.

Action and Uses.—Strophanthin acts on the heart in a manner similar to that of digitalis, but while digitalis produces marked peripheral vasoconstriction, strophanthin is almost without this action. For this reason it is to be preferred when the heart is weak. It is absorbed more rapidly, is non-cumulative, and is less likely to produce gastro-intestinal irritation than digitalis; it occasionally, however, causes

diarrhœa. It is a more efficient diuretic since it raises blood pressure without producing constriction of the renal vessels, so that more blood passes through the kidneys. It is an extremely powerful poison, arresting the action of the heart in systole, and it should be used with caution. It should be **administered** intramuscularly or intravenously; subcutaneous injections are absorbed less readily and may give rise to inflammation. Small doses have been given intravenously with great success in urgent cases. A solution for **injection** is prepared by aseptic methods and transferred to sterilised containers which are afterwards sealed to exclude bacteria; the solution is then heated to 80° for one hour and should be used within twenty-four hours. In cases of **poisoning** by strophanthin, the procedure described for Strophanthus should be adopted.

Dose.—0·00025 to 0·001 gramme ($\frac{1}{240}$ to $\frac{1}{60}$ grain), by intramuscular or intravenous injection.

OUABAINUM.—Ouabain, or g-strophanthin, is present in the wood of *Acokanthera Schimperi* Oliver (Fam. Apocynaceæ), and is obtained from the seeds of *Strophanthus gratus* Franch. It crystallises with about 12 per cent. of water of crystallisation and is rendered anhydrous by heating at 130°. It begins to soften at about 180°, and gives a red colouration with sulphuric acid. The specific rotation of anhydrous ouabain is from −31·3° to −31·9°. Ouabain is nearly twice as toxic as k-strophanthin, and is used as an international standard for the control of the standard preparation of strophanthin which is used for the biological assay of strophanthin and tincture of strophanthus. The standard preparation of strophanthin is compared with international standard ouabain by the frog method, and issued by the National Institute for Medical Research, London. The standard tincture of strophanthus is equivalent in activity to a 0·42 per cent. w/v solution of the standard ouabain, or to a 0·33 per cent. w/v solution of anhydrous ouabain, when the comparison is made by the frog method.

STROPHANTHUS

(Strophanth.)

Strophanthus

Synonyms—Strophanthi Semina; Strophanthus Seeds.

Strophanthus consists of the dried, ripe seeds, freed from the awns, of *Strophanthus kombé* Oliver (Fam. Apocynaceæ), a climbing plant indigenous to tropical East Africa.

The seeds are about 12 to 18 millimetres long, 3 to 5 millimetres broad and 2 millimetres thick, lanceolate to linear-lanceolate, with a truncated-acuminate apex and an obtuse and slightly winged base. The surface is silky, due to appressed hairs directed towards the apex, the colour being feebly greyish-green or greenish-fawn. A ridge runs longitudinally from the centre of the ventral side to the apex. Within the testa, a narrow, oily endosperm surrounds a large, white, straight embryo with oily cotyledons. The odour is characteristic and the taste is very bitter.

The diagnostic **microscopical** characters are the outer epidermal cells of the testa, elongated-polygonal in shape, with straight, thickened and lignified anticlinal walls, many extended into trichomes each having on the under side a single, longitudinal, lignified rib; the occasional cluster-crystals and single prisms of calcium oxalate in the cells of the testa; the parenchyma of the endosperm and embryo containing aleurone grains and fixed oil. When treated with a drop of sulphuric acid (66 per cent. v/v), the endosperm exhibits an intense green colour.

Strophanthus **contains** from 7 to 10 per cent. of a mixture of glycosides, known as k-strophanthin, together with about 25 per cent. of fixed oil. K-strophanthin consists of cymarin, k-strophanthin-β and other glycosides, and yields on hydrolysis with a dilute mineral acid strophanthidin and a biose. The drug also contains kombic acid, choline and trigonelline.

Substitutes.—The seeds of *Strophanthus hispidus* DC. are smaller and brownish in colour; they bear scattered hairs, the greater part having been removed by friction; they give a green colouration with sulphuric acid; only a few clusters and prisms of calcium oxalate are present in the seed coat. The seeds of *S. Courmonti* Sacl. have a brownish tinge, and are smaller in size, more lanceolate, less bitter, and have abundant prismatic crystals of calcium oxalate in the testa; they give a red to violet colouration with sulphuric acid. The seeds of *S. Nicholsoni* Holmes have a covering of whitish, woolly hairs; calcium oxalate is absent; they give a red colouration with sulphuric acid. The seeds of *S. gratus* Franch. are brown, and glabrous to the naked eye, the trichomes being reduced to conical papillæ; calcium oxalate is absent; they give a red colouration with sulphuric acid and contain the glycoside, ouabain (known also as g-strophanthin), which is more toxic than strophanthin. The seeds of *S. Emini* Aschers are shining brownish-yellow, being thickly covered with hairs; they give a red to violet colouration with sulphuric acid; calcium oxalate crystals are absent. The seeds of *S. sarmentosus* DC. are reddish-brown to greenish; the trichomes are yellowish and easily break off; cluster-crystals of calcium oxalate are abundant in the cotyledons, while both single crystals and clusters occur in the seed coat; with sulphuric acid they give a pale rose-red colouration.

Standard, B.P.—Strophanthus contains not more than 2 per cent. of foreign organic matter. Ash, not more than 5 per cent.

Action and Uses.—The properties of strophanthus are virtually those of strophanthin. Strophanthus is used in place of digitalis when a rapid cardiac action is required, since tincture of strophanthus acts in from half to one hour, whilst tincture of digitalis requires from thirty-six to forty-eight hours. Strophanthus differs from digitalis not only in its smaller effect on blood vessels, but in its smaller action on the vagus nerve. It does not, therefore, slow the heart to the same extent as digitalis. It is, however, undoubtedly a more dangerous drug to use since it is easily absorbed and much more readily induces delirium cordis. In mitral disease with sudden failure of compensation, and in the cardiac weakness of pneumonia and other acute illnesses, strophanthus is of especial value and it sometimes succeeds when digitalis fails. In some cases it has been found an advantage to give alternate courses of strophanthus and digitalis. The tincture is the most generally used preparation of strophanthus; it is extremely rapid in its action and should be given in small doses, 0·12 to 0·3 millilitre (2 to 5 minims).

In cases of **poisoning** by strophanthus, the stomach pump should be employed or emetics given, followed in either case by an aqueous solution of gallic or tannic acid and stimulants. The heart becomes very rapid, beats are dropped and later become uncountable, resulting in the condition known as "delirium cordis." Death occurs suddenly. Everything should be done which is likely to depress the increased irritability of the heart; inhalations of chloroform are most likely to be successful.

Preparations

Extractum Strophanthi, B.P.C.—(Ext. Strophanth.)—Extract of Strophanthus. A dry extract, 1 in 2. Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

This extract was included in the British Pharmacopœia, 1914.

Tinctura Strophanthi, B.P.—(Tinct. Strophanth.)—Tincture of Strophanthus. It is prepared by percolating strophanthus, previously defatted with light petroleum, with alcohol (70 per cent.), and possesses a degree of activity equivalent to that of the standard tincture of strophanthus. Dose.– 0·12 to 0·3 millilitre (2 to 5 minims).

Tinctura Strophanthi I.A. is prepared with alcohol (70 per cent.) from 10 per cent. w/w of the defatted seeds of *Strophanthus hispidus* or *S. kombé.* Tinctura Strophanthi grati I.A. is prepared with alcohol (70 per cent.) from 10 per cent. w/w of the defatted seeds of *S. gratus.*

STRYCHNINA

(Strych.)

Strychnine

$C_{21}H_{22}O_2N_2 = 334·2$

Strychnine is the chief alkaloidal constituent of the seeds of various species of *Strychnos.* It may be prepared by extracting a mixture of ground nux vomica beans and slaked lime with benzene, the total alkaloids being subsequently transferred to dilute sulphuric acid, from which the bases are again regenerated by sodium hydroxide solution. Crude strychnine may be obtained by crystallisation from alcohol, and may be purified by conversion into, and recrystallisation of, the sulphate. The alkaloid may be precipitated by ammonia from an aqueous solution of the sulphate thus obtained and then recrystallised from boiling alcohol.

Strychnine occurs in the form of translucent, trimetric, odourless, colourless, anhydrous prisms or as a white, crystalline powder, having an extremely bitter and afterwards metallic taste; it is very poisonous. The aqueous solution is intensely bitter, the bitterness being discernible in a solution of 1 in 700,000. Strychnine melts, with decomposition, between 270° and 280°. The specific rotation in alcohol is about −133°. It is precipitated by alkalis from its acid solutions. Even very dilute solutions of strychnine salts yield precipitates with the usual alkaloidal reagents. Sulphuric acid containing 1 per cent. of ammonium vanadate gives a deep violet-blue colour, changing to deep purple, and

on dilution with water a cherry-red colour is produced which persists for some time. When a small fragment is dissolved in 2 or 3 drops of sulphuric acid on a white porcelain plate, and a small crystal of potassium dichromate is slowly moved through the solution, an intense violet colour is produced which passes through red to yellow.

Soluble in water (about 1 in 7000), boiling water (1 in 2500), alcohol (90 per cent.) (1 in 150), boiling alcohol (90 per cent.) (1 in 12), dehydrated alcohol (1 in 350), boiling dehydrated alcohol (1 in 40) and chloroform (1 in 6), benzene (1 in 160); nearly insoluble in ether.

Standard.—Strychnine contains not less than 99 per cent. of $C_{21}H_{22}O_2N_2$. Ash, not more than 0·1 per cent. 0·25 gramme dissolves in 5 millilitres of sulphuric acid, the solution being not more than faintly yellow (limit of readily carbonisable impurities). To 0·1 gramme add 1 millilitre of a mixture of equal parts of nitric acid and water; a yellow but not a red or reddish colour is produced (limit of brucine).

Assay.—Dissolve about 0·5 gramme, accurately weighed, in 10 millilitres of N/10 sulphuric acid and titrate with N/10 sodium hydroxide using solution of cochineal as indicator; each millilitre of N/10 sulphuric acid is equivalent to 0·03342 gramme of $C_{21}H_{22}O_2N_2$.

Action and Uses.—Strychnine has the action of a bitter in the mouth, increasing the appetite and augmenting the flow of gastric juice. It is rapidly absorbed as it reaches the intestines, the alkaloid and its salts being more readily absorbed than the preparations of nux vomica. After absorption strychnine exerts its characteristic effects upon the central nervous system. Through its action on the sensory portion of the cord, the reflexes are exaggerated and the normal tonus of striped muscle increased. The medulla is stimulated, the movements of respiration are deepened and quickened, peripheral vessels are constricted through stimulation of the vasomotor centre, and the heart slowed through excitation of the vagal centre. The sense organs are stimulated, so that the senses of smell, touch, hearing and vision are rendered more acute. The blood pressure is raised by the vasoconstriction produced, so that strychnine improves the pulse and is a valuable tonic to the circulatory system in cardiac failure. Strychnine acts as an aphrodisiac in the male, on account of its action in augmenting the reflexes of the cord. It reflexly increases the tonus of plain muscle, and also has a direct stimulant effect, so that it is of value in such conditions as chronic constipation, atony of the bladder, etc. Strychnine is excreted very slowly, and its action is therefore cumulative. Warning signs are increased reflexes and twitching of muscles.

Strychnine is much used as a gastric tonic in dyspepsia and as a general tonic in convalescence from acute disease; with atropine it is used hypodermically, and by the mouth in dipsomania. It is **administered** as solution of the hydrochloride in mixture form, often with mineral acids, or in pills, or in syrups such as Easton's syrup and compound syrup of hypophosphites. It is added to aperient pills to increase

peristalsis, but preparations of nux vomica are often preferred for this purpose. It is used in surgical shock and in cardiac failure, large doses, up to 0·006 gramme ($\frac{1}{100}$ grain), being given by hypodermic injection. It is also added to solutions of local anæsthetics for high intraspinal injections (0·0005 to 0·001 gramme) to prevent respiratory failure, but it is not uniformly successful for this purpose. It is used as an antidote in chloral and chloroform poisoning. Strychnine, given hypodermically in the form of strychnine nitrate in doses varying from 0·004 gramme ($\frac{1}{160}$ grain) up to as much as 0·067 gramme ($1\frac{1}{3}$ grain), has been used with success in the treatment of snake bite.

Symptoms of poisoning may supervene suddenly, with tremors, twitching of limbs and violent convulsions; the body becomes rigid; the face muscles become contracted, producing a characteristic grinning expression known as "risus sardonicus." In cases of **poisoning** by strychnine, apomorphine by injection, emetics, or the stomach pump should be used, and tannin or potassium permanganate administered to render the strychnine inactive, or charcoal in fine powder may be given to adsorb the poison. The convulsions are controlled by chloroform anæsthesia, or by large doses of chloral or bromide. The administration of urethane in large doses (10 to 20 grammes), or the intravenous injection of soluble barbitone or soluble phenobarbitone, is considered of value as an antidotal measure. Artificial respiration or inhalation of oxygen containing 10 per cent. v/v of carbon dioxide is employed if paralysis intervenes. Strychnine is the principal ingredient of many vermin killers.

Dose.– 0·002 to 0·008 gramme ($\frac{1}{32}$ to $\frac{1}{8}$ grain).

Preparations

Pilulæ Aloini et Strychninæ Compositæ, B.P.C.—(Pil. Aloin. et Strych. Co.)—Compound Aloin and Strychnine Pills. Each pill contains $\frac{1}{6}$ grain of aloin, $\frac{1}{60}$ grain of strychnine, $\frac{1}{10}$ grain of dry extract of belladonna, and $\frac{1}{20}$ grain of powdered ipecacuanha. Dose.– 1 or 2 pills.

Syrupus Ferri Bromidi cum Quinina et Strychnina, B.P.C.—(Syr. Ferr. Brom. c. Quinin. et Strych.)—Syrup of Ferrous Bromide with Quinine and Strychnine. Strychnine, about 0·03 per cent. w/v, and quinine dihydrobromide, 2 per cent. w/v, with dilute hydrobromic acid, distilled water and syrup of ferrous bromide; each fluid drachm contains about $\frac{1}{133}$ grain of strychnine, $1\frac{1}{10}$ grains of quinine dihydrobromide and 4 grains of ferrous bromide. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

STRYCHNINÆ HYDROCHLORIDUM

(Strych. Hydrochlor.)

Strychnine Hydrochloride

$C_{21}H_{22}O_2N_2,HCl,2H_2O = 406·7$

Strychnine hydrochloride may be prepared by dissolving strychnine

in hydrochloric acid and crystallising from neutral solution. It crystallises with a slightly variable proportion of water of crystallisation, corresponding to from $1\frac{1}{2}$ to 2 molecules. Strychnine hydrochloride occurs in colourless, odourless, prismatic crystals, having an intensely bitter taste. It is permanent in air. The aqueous solution is neutral to litmus and is lævorotatory. The salt is less soluble in acid solutions than in water, and is precipitated from a 1 per cent. aqueous solution on the addition of hydrochloric acid. On the addition of alkalis to the aqueous solution, the alkaloid is precipitated. It responds to the tests with sulphuric acid and potassium dichromate and ammonium vanadate described under Strychnina. With platinum chloride it yields a yellowish-white precipitate which is almost insoluble in water and separates from hot diluted alcohol in golden crystals. It loses its water of crystallisation at 110°, but is not decomposed, even at 150°.

Soluble in water (about 1 in 40) and alcohol (90 per cent.) (about 1 in 80); insoluble in ether.

Standard, B.P.—Strychnine hydrochloride loses, on drying at 110°, not less than 7 per cent. and not more than 9 per cent. of its weight. Ash, not more than 0·1 per cent. It complies also with limit tests for brucine, sulphate and readily carbonisable substances.

Action and Uses.—Strychnine hydrochloride resembles strychnine in its action. It is **administered** usually as Liquor Strychninæ Hydrochloridi in mixture form, this solution being best prescribed in acid mixtures. The solution may be used for hypodermic injection, but Injectio Strychninæ, which is prepared without alcohol, is preferable. Strychnine hydrochloride is **incompatible** with alkalis and their carbonates, aromatic spirit of ammonia, solution of sodium arsenate, alkaline arsenical solution and iodides. When more than 8 minims of a 1 per cent. solution to 1 fluid ounce of water is prescribed with alkalis, the strychnine is liable to be precipitated. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration, and the containers should comply with the tests for limit of alkalinity of glass.

Dose.– 0·002 to 0·008 gramme ($\frac{1}{30}$ to $\frac{1}{8}$ grain).

STRYCHNINÆ ARSENAS.—Strychnine arsenate, $C_{21}H_{22}O_2N_2,H_3AsO_4,\frac{1}{2}H_2O$, occurs in the form of small, white, acicular crystals or as a white, crystalline powder. It is soluble in water (about 1 in 14) and in hot water (about 1 in 5). Strychnine arsenate has been used hypodermically in phthisis, and has also been given internally in doses of 0·001 to 0·004 gramme ($\frac{1}{60}$ to $\frac{1}{15}$ grain) in bronchial asthma and emphysema.

STRYCHNINÆ FORMAS.—Strychnine formate, $C_{21}H_{22}O_2N_2,H{\cdot}COOH$, occurs in the form of a white, crystalline powder composed of small, acicular crystals. It is soluble in water (about 1 in 5) and in alcohol. Strychnine formate is used as a nerve stimulant and muscular tonic with other formates in the preparation of compound syrups and elixirs. It has been administered hypodermically in doses of 0·001 gramme ($\frac{1}{64}$ grain).

Preparations

Extractum Malti Liquidum cum Quinina et Strychnina, B.P.C.—(Ext. Malt. Liq. c. Quinin. et Strych.)—Liquid Extract of Malt with Quinine and Strychnine. 4 fluid drachms contains about ½ grain of quinine hydrochloride and $\frac{1}{24}$ grain of strychnine hydrochloride, in liquid extract of malt. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Injectio Strychninæ, B.P.C.—(Inj. Strych.)—Injection of Strychnine. It contains 0·75 per cent. w/v of strychnine hydrochloride; 0·6 millilitre contains 0·0045 gramme, and 5 minims contain about $\frac{1}{80}$ grain, of strychnine hydrochloride. Dose.– 0·3 to 0·6 millilitre (5 to 10 minims), by subcutaneous injection.

This injection was included in the British Pharmacopœia, 1914, under the name of Injectio Strychninæ Hypodermica.

Liquor Quininæ et Strychninæ, B.P.C.—(Liq. Quinin. et Strych.)—Solution of Quinine and Strychnine. It contains quinine sulphate equivalent to from 8·51 to 9·01 per cent. w/v of anhydrous quinine, and strychnine hydrochloride equivalent to from 0·186 to 0·206 per cent. w/v of strychnine, with hypophosphorous acid, glycerin and water. A syrup differing from Syrupus Ferri Phosphatis cum Quinina et Strychnina B.P. only in the presence of 0·75 per cent. v/v of hypophosphorous acid may be made by mixing 1 fluid ounce of this solution, 1 fluid ounce of solution of ferrous phosphate, ½ fluid ounce of glycerin and 1 fluid ounce of distilled water with sufficient syrup to produce 8 fluid ounces.

Liquor Strychninæ Hydrochloridi, B.P.—(Liq. Strych. Hydrochlor.)—Solution of Strychnine Hydrochloride. It contains 1 per cent. w/v of strychnine hydrochloride (limits, 0·95 to 1·05) in alcohol (90 per cent.) and distilled water; 0·8 millilitre contains 0·008 gramme, and 12 minims contains about $\frac{1}{10}$ grain, of strychnine hydrochloride. Dose.– 0·2 to 0·8 millilitre (3 to 12 minims).

Pilulæ Ferri Phosphatis cum Quinina et Strychnina, B.P.C.—(Pil. Ferr. Phosph. c. Quinin. et Strych.)—Iron Phosphate Pills with Quinine and Strychnine. *Syn.*—Pilulæ Trium Phosphatum; Easton's Pills; Pilulæ Ferri et Quininæ et Strychninæ Phosphatum. Each pill contains 1½ grains of saccharated iron phosphate, about ½ grain of quinine sulphate and $\frac{1}{120}$ grain of strychnine hydrochloride, and is approximately equivalent to ¼ fluid drachm of syrup of ferrous phosphate with quinine and strychnine. Dose.– 1 or 2 pills.

Syrupus Ferri Phosphatis cum Quinina et Strychnina, B.P.—(Syr. Ferr. Phosph. c. Quinin. et Strych.)—Syrup of Ferrous Phosphate with Quinine and Strychnine. *Syn.*—Easton's Syrup. It contains iron equivalent to 1·8 per cent. w/v of anhydrous ferrous phosphate, $Fe_3(PO_4)_2$ (limits, 1·62 to 1·98), 1·09 per cent. w/v of anhydrous quinine (limits, 1·04 to 1·2), and 0·0246 per cent. w/v of strychnine (limits, 0·022 to 0·027), with syrup, glycerin and distilled water. 4 millilitres contains the equivalent of 0·072 gramme of anhydrous ferrous phosphate or about 0·034 gramme of iron, about 0·059 gramme of quinine sulphate and about 0·0012 gramme of strychnine hydrochloride; 1 fluid drachm contains the equivalent of about 1 grain of anhydrous ferrous phosphate or about ⅛ grain of iron, about ¼ grain of quinine sulphate and about $\frac{1}{60}$ grain of strychnine hydrochloride. The proportion of strychnine is approximately one half the proportion of strychnine contained in the corresponding preparation of the British Pharmacopœia, 1914. It should be stored in completely-filled, well-closed containers and protected from light. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tabellæ Ferri Phosphatis cum Quinina et Strychnina, B.P.C.—(Tab. Ferr. Phosph. c. Quinin. et Strych.)—Tablets of Ferrous Phosphate with Quinine and Strychnine. *Syn.*—Tabellæ Trium Phosphatum; Easton's Tablets; Tabellæ Eastonii; Tabellæ Ferri et Quininæ et Strychninæ Phosphatum. Each tablet contains about 2½ grains of saccharated iron phosphate, ¼ grain of quinine sulphate, and about $\frac{1}{150}$ grain of strychnine hydrochloride, and is approximately equivalent to 1 fluid drachm of syrup of ferrous phosphate, with quinine and strychnine. Dose.– 1 tablet.

STRYCHNINÆ NITRAS

(Strych. Nit.)

Strychnine Nitrate

$C_{21}H_{22}O_2N_2,HNO_3 = 397{\cdot}2$

Strychnine nitrate may be prepared by dissolving strychnine in nitric acid and crystallising from a neutral solution. It occurs in colourless, glistening needles which are odourless and have an intensely bitter taste. When heated, the salt decomposes without melting. Its aqueous solutions are neutral to methyl red and are lævorotatory.

Soluble in water (1 in 60), alcohol (1 in 120), glycerin and chloroform.

Standard.—Strychnine nitrate leaves not more than 0·1 per cent. of ash. Dissolve 0·2 gramme in 5 millilitres of hot water, and add 0·5 millilitre of barium chloride solution; the liquid remains clear on boiling (limit of sulphate). It complies with the limit test for brucine in Strychnina.

Action and Uses.—Strychnine nitrate is used for similar purposes to the hydrochloride. An aqueous solution (1 in 100) is **administered** as a hypodermic injection. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration, and the containers should comply with the tests for limit of alkalinity of glass.

Dose.– 0·002 to 0·008 gramme ($\frac{1}{32}$ to $\frac{1}{8}$ grain).

STRYCHNINÆ SULPHAS

(Strych. Sulph.)

Strychnine Sulphate

$(C_{21}H_{22}O_2N_2)_2,H_2SO_4,5H_2O = 856{\cdot}5$

Strychnine sulphate may be prepared by adding powdered strychnine, in slight excess, to warm dilute sulphuric acid, filtering the solution, concentrating and crystallising. It occurs in colourless, odourless crystals or as a white, crystalline powder, and has an intensely bitter taste. The salt loses its water of crystallisation when heated at 100° and melts at about 200°. Its aqueous solution is neutral to methyl red and is lævorotatory.

Soluble in water (1 in about 50) and alcohol (1 in 135); slightly soluble in chloroform; insoluble in ether.

Standard.—Strychnine sulphate loses, on drying at 100°, not less than 9 per cent. and not more than 11 per cent. of its weight. Ash, not more than 0·1 per cent. It complies with the limit test for brucine in Strychnina.

Action and Uses.—Strychnine sulphate is used for similar purposes to the hydrochloride. An aqueous solution is **administered** as a

hypodermic injection. Solutions for **injection** may be sterilised by heating in an autoclave, by tyndallisation, or by filtration, and the containers should comply with the tests for limit of alkalinity of glass.

Dose.– 0·002 to 0·008 gramme ($\frac{1}{32}$ to $\frac{1}{8}$ grain).

STYRAX
(Styr.)
Storax

Synonyms—Styrax Præparatus; Prepared Storax.

Storax is the purified balsam obtained from the trunk of *Liquidambar orientalis* Mill. (Fam. Hamamelidaceæ), a tree indigenous to the South-West of Asiatic Turkey. The secretion of the crude balsam, which is not a normal production of the tree, is induced by wounding the bark. The injury thus inflicted on the cambium results in the formation of numerous oleo-resin ducts in which the balsam is secreted and from which it is discharged into the wounded bark. The latter is removed, and the balsam separated by pressing, boiling with water, again pressing, and finally separating the aqueous layer. Thus obtained it forms an opaque, greyish, viscid liquid which on standing separates into a supernatant aqueous liquid and a dark brown oleo-resinous layer; it contains about 20 to 30 per cent. of water together with fragments of bark, etc. From these it is purified by solution in alcohol, filtration and evaporation.

Storax occurs as a brown, viscous liquid which is transparent in thin layers and has an agreeable balsamic odour and taste. When warmed with an aqueous solution of potassium chromate and sulphuric acid, the odour of benzaldehyde is evolved. Storax consists of a resin mixed with an oily liquid. The former consists of storesinol partly free and partly combined with cinnamic acid. The oily liquid contains styrol, vanillin and free cinnamic acid, together with its ethyl, phenylpropyl and cinnamyl esters.

Soluble in alcohol (90 per cent.), ether, carbon disulphide, chloroform and glacial acetic acid.

Standard, B.P.—Storax contains not less than 30 per cent. of total balsamic acids, calculated on the substance dried on a water-bath for one hour. Loss on drying in a thin layer on a water-bath for one hour, not more than 5 per cent. Acid value, 55 to 90; ester value, 100 to 133; saponification value, 170 to 200, all being calculated on the substance dried on a water-bath for one hour.

Action and Uses.—Storax closely resembles balsam of Peru in its action. An ointment prepared with benzoinated lard (1 in 4) is used as a parasiticide in scabies and other parasitic skin affections.

Dose.– 0·6 to 2 grammes (10 to 30 minims).

SUCCUS AURANTII
(Succ. Aurant.)
Orange Juice

Orange juice is the expressed juice of the sweet orange, *Citrus sinensis* (Linn.) Osbeck. It occurs as a turbid, yellow liquid with the characteristic odour and taste of fresh oranges. It contains the antiscorbutic vitamin C. Orange juice may be concentrated *in vacuo* to about one-seventh of its volume without appreciable loss of vitamin C. It is in this form, with or without the addition of sugar or partial removal of the citric acid, that it is most frequently found in commerce. During concentration it loses most of the orange odour and flavour. Such concentrates retain their antiscorbutic activity for a considerable length of time. The assay for vitamin C potency of concentrated orange juice is conducted by a method described for vitamin C concentrates, the unit being the unit of antiscorbutic vitamin C recommended by the Permanent Commission on Biological Standardisation of the League of Nations.

Standard.—Orange juice complies with the Public Health (Preservatives in Food) Regulations, when it contains either not more than 350 parts per million of sulphur dioxide, or not more than 600 parts per million of benzoic acid, and contains no other preservative.

Action and Uses.—Orange juice is used as an antiscorbutic. The protective dose, to replace fresh fruit and vegetables in the diet, is about four ounces daily. The characters and uses of vitamin C are described under Succus Limonis.

SUCCUS LIMONIS
(Succ. Limon.)
Lemon Juice

Lemon juice is the expressed juice of the ripe fruit of *Citrus Limonia* Osbeck. It occurs as a slightly turbid, yellow liquid, with a sharply acid taste and an odour of fresh lemons. It may be preserved by the addition of 10 per cent. of alcohol. Lemon juice contains the water-soluble vitamin C. It may be concentrated *in vacuo* to about one-seventh of its volume without appreciable loss of vitamin; in this form, with or without the addition of sugar or partial removal of the citric acid, it is also met with in commerce. The assay for vitamin C potency of lemon juices is conducted by a method described for vitamin C concentrates, the unit being the unit of antiscorbutic vitamin C recommended by the Permanent Commission on Biological Standardisation of the League of Nations.

Standard.—Lemon juice contains not less than 7 per cent. and not more than 9 per cent. w/v of acid, calculated as citric acid, $C_6H_8O_7,1H_2O$.

Specific gravity, 1·030 to 1·045. Ash, not more than 0·5 per cent. w/v. It complies with the Public Health (Preservatives in Food) Regulations, when it contains either not more than 350 parts per million of sulphur dioxide, or not more than 600 parts per million of benzoic acid, and contains no other preservative.

Assay.—Titrate 20 millilitres with N/1 sodium hydroxide, using phenolphthalein as indicator; each millilitre of N/1 sodium hydroxide is equivalent to 0·07003 gramme of $C_6H_8O_7,H_2O$.

Action and Uses.—Lemon juice is employed as a means of administering vitamin C for the prevention or treatment of scurvy. Vitamin C in the form of orange juice or lemon juice is regarded as a necessary adjunct to the diet in infant feeding, owing to the paucity of vitamin C in milk and the ease with which it is destroyed on heating. Lemon juice well diluted is used as a cooling and refreshing beverage in febrile conditions. It may also be given in effervescence with alkali bicarbonates as an antacid drink, and for the sedative effect on the stomach of the evolved carbon dioxide.

VITAMIN C CONCENTRATES.—Vitamin C is present in the juice of lemon, orange, grape fruit, and some other fruit juices, in fresh green vegetables and in the germinating seeds of pulses. Decitrated orange and lemon juices are convenient starting points in making concentrates of vitamin C. When concentrated to one-tenth of their volume, they keep well when acidified by the addition of 7 grammes of citric acid per litre and stored in the dark in air-free containers. The activity of decitrated lemon juice can be increased by fermentation with yeast in an atmosphere of carbon dioxide. Concentration of vitamin C from lemon juice may be effected by precipitating the organic acids by an excess of calcium carbonate. After the mixture has stood for one hour, the liquid is filtered through a Buchner funnel, and a saturated solution of normal lead acetate added. The quantity of lead acetate must be such that the final preparation has a reducing power to 0·02 per cent. solution of phenolindophenol of not less than 6 millilitres for an equivalent of 5 millilitres of the original decitrated juice. After immediate filtration, or separation by means of a centrifuge, the liquid is adjusted to *p*H 7·2 to 7·4 by addition of 6 per cent. solution of ammonia. The precipitate, which contains the vitamin, is removed by means of a centrifuge and dissolved in 10 per cent. acetic acid. The lead is removed by addition of saturated magnesium sulphate solution and 2 volumes of alcohol. After filtration, the solution is concentrated to a small volume to remove the greater part of the acetic acid.

In the absence of the water-soluble vitamin C from the diet, scurvy develops in human beings in about four months, the principal symptoms being sore and bleeding gums, diarrhœa, œdema and sub-periosteal hæmorrhage. Some cases of purpura hæmorrhagica are probably due to a deficiency of vitamin C, for it is found that when the supply of this vitamin is inadequate, changes occur in the endothelium of the blood vessels, with escape of red blood cells into the tissues. Chronic hypertrophy of the gums occurring in children may likewise be due to a deficiency of vitamin C. Experimental scurvy in guinea pigs fed upon a diet free from vitamin C commences in about three weeks, after which a decline in weight sets in and death ensues within six weeks. The histological changes at the rib junction are diagnostic, varying from slight disarrangement in incipient scurvy to complete breakdown at the junction of cartilage cells and bony trabeculæ. The earliest recognisable symtom of scurvy is degeneration of the pulp and dentine of the teeth. The nerve cells, blood vessels and odontoblastic cells are converted into a fibroid mass without any trace of cellular organisation.

The biological assay for vitamin C may be carried out by feeding guinea pigs on a diet complete in all respects except in its content of vitamin C. To this diet is added various proportions of the substance under investigation, and the least

amount of the substance necessary to protect the animal from contracting scurvy is taken as the minimum protective dose. The length of time required for this assay varies from one to three months. A more rapid method is to follow the incidence of scurvy by microscopic examination of sections of the roots of the lower incisor teeth of the guinea pig. The advantages of this method of assay are the shorter time required for the test and the greater accuracy in fixing the fully protective dose. The dose required for complete protection, as judged by this method, is about twice that required to prevent the macroscopic lesions of scurvy. The anti-scorbutic potency of the preparation under test is determined in terms of the dose of a standard antiscorbutic substance, which would afford the same degree of protection against scurvy. The unit of the antiscorbutic vitamin C recommended by the Permanent Commission on Biological Standardisation of the League of Nations is the vitamin C activity of 0·1 millilitre of fresh lemon juice. This is about one-tenth of the daily dose necessary to prevent the development of macroscopic scorbutic lesions in a young guinea pig maintained on a scurvy-producing diet. The fresh lemon juice may be decitrated by filtration through muslin and adding an excess of calcium carbonate until effervescence ceases; after standing for one hour, the mixture is filtered, and the juice, which should have a *p*H of about 6, should be administered to the experimental animals within two hours of filtration.

Vitamin C is soluble in water, alcohol and methyl alcohol; insoluble in butyl alcohol and light petroleum. It is sensitive to oxidising agents and to air. Inactivation takes place rapidly at room temperature in alkaline solution in the presence of air, but not in the absence of air. At *p*H 12·5 decitrated lemon juice loses 80 per cent. of its potency on exposure to air for thirty minutes, and all its potency in three hours. When preserved anaerobically, it does not appreciably decrease in potency during twenty-four hours. Even in the absence of all preservatives, comparatively little change occurs in lemon juice kept at 0° for several months. It does not deteriorate in eighteen months at room temperature in the presence of a small proportion of oil of lemon. The zone of optimal stability at ordinary temperatures is in the neighbourhood of the natural acidity of the juice (*p*H 2·2) and natural juice can be kept without loss of potency for as long as fourteen months at room temperature without any addition, although it becomes heavily infected with mould and yeast. Conditions which preserve sterility tend to cause deterioration of antiscorbutic potency. Orange juice retains its antiscorbutic potency for eighteen months at room temperature in presence of a small proportion of oil of orange, but at 7° it loses its activity.

Vitamin C is believed to be identical with ascorbic acid, $C_6H_8O_6$, which has been obtained from the cortex of the suprarenal gland and also from paprika, the fruit of a Hungarian variety of *Capsicum annuum*. The antiscorbutic potency of suprarenal cortex is about three times that of orange juice, and is proportional to its content of ascorbic acid. Ascorbic acid, in doses of 1 milligram daily, protects guinea pigs from scurvy. It exerts a marked reducing action on 2 : 6-dichlorophenolindophenol, and this reaction has been made the basis of a chemical method of assay for antiscorbutic potency. Results by this method are closely in agreement with those obtained biologically, but the test is apparently not truly specific for vitamin C.

SUCROSUM

(Sucros.)

Sucrose

$C_{12}H_{22}O_{11} = 342·2$

Synonyms—Saccharum Purificatum; Refined Sugar.

Sucrose may be obtained from the juice of the sugar cane, *Saccharum officinarum* Linn. (Fam. Gramineæ), or of the sugar beet, *Beta vulgaris* var. *Rapa* Dumort. (Fam. Chenopodiaceæ). It is extracted from the

sugar cane by boiling the neutralised expressed juice with milk of lime, and evaporating the filtered liquid under reduced pressure. The crude sugar thus obtained is decolourised with charcoal and recrystallised. Sucrose is obtained from the sugar beet by allowing the non-colloidal materials to diffuse from the cells into hot water, the resulting solution being then treated as described above. In both cases the mother liquors contain a considerable quantity of sugar which is separated as the sparingly soluble double compound of sucrose with barium or strontium hydroxide. Occasionally the yellowish tinge of imperfectly purified sugar is masked by the addition of a blue dye; when ultramarine is used, such sugars are liable to produce unpleasant odours when used in the preparation of acid syrups and should not be used for pharmaceutical purposes.

Sucrose occurs in odourless, colourless, crystals or crystalline masses, having a sweet taste. When heated, it fuses at about 160° and does not crystallise on cooling; at higher temperatures it becomes black and froths, forming a bulky carbonaceous residue with a bitter taste. Sucrose does not reduce Fehling's solution. The aqueous solution is clear, colourless and odourless, and is dextrorotatory; when boiled with dilute acids, the sucrose is hydrolysed into equimolecular proportions of lævulose and dextrose, or "invert sugar;" the solution is then lævorotatory and, after neutralisation, readily reduces Fehling's solution. The rate of hydrolysis is very much more rapid than that of any other disaccharide.

Soluble in water (1 in 0·5) and alcohol (90 per cent.) (about 1 in 60).

Standard, B.P.—Sucrose has a specific rotation in 10 per cent. w/v aqueous solution of not less than + 66° and not more than + 66·7°. Ash, not more than 0·05 per cent. Arsenic limit, 1 part per million. Lead limit, 2 parts per million. It complies also with a test for neutrality, with a test for absence of ultramarine, and with limit tests for reducing sugars and for barium and strontium.

Action and Uses.—Sucrose is employed in pharmacy chiefly as a sweetening agent, and as a demulcent and preservative. In large quantities sucrose irritates the stomach and bowels and exerts a mild aperient action. Weak solutions of sucrose are prone to ferment, but saturated solutions may be preserved indefinitely, the osmotic conditions preventing the growth of bacteria and fungi. The use of sucrose in large quantities is recommended in such wasting diseases as phthisis and cancer. Intravenous injections of sucrose in cases of cardiac failure are stated to exert a marked recuperative effect. Solutions of sucrose dissolve calcium hydroxide freely, forming a calcium saccharate. The syrups are used as flavouring agents and as permanent solutions of active medicinal substances.

SACCHARUM USTUM.— Burnt sugar, or caramel, may be prepared by heating sucrose, with occasional stirring, at about 180° to 200° until a black, viscid mass is formed. It is then mixed with sufficient hot water to produce a liquid of specific gravity 1·4, and strained. Burnt sugar is used as a colouring agent; it is precipitated by alcohol.

THERIACA.—Treacle is the uncrystallisable residue from the refining of cane sugar. It occurs as a thick, brown, sweet, fermentable syrup, free from empyreumatic odour or taste, and does not crystallise on standing.

Preparations

Liquor Sacchari Usti, B.P.C.—(Liq. Sacch. Ust.)—Solution of Burnt Sugar. Burnt sugar and chloroform water, equal parts.

Syrupus, B.P.—(Syr.)—Syrup. Sucrose, 66 7 per cent. w/w, dissolved in water. Specific gravity, 1·320 to 1·332. Optical rotation, +56° to +59°.

SULPHARSPHENAMINA
(Sulpharsphenamin.)

Sulpharsphenamine

Synonym—Sulpharsenobenzene.

Sulpharsphenamine consists mainly of disodium 3 : 3′- diamino- 4 : 4′ - dihydroxyarsenobenzene - N : N′ - dimethylenebisulphite, $(NH{\cdot}CH_2{\cdot}O{\cdot}SO_2Na)(OH)C_6H_3As : AsC_6H_3(OH)(NH{\cdot}CH_2{\cdot}O{\cdot}SO_2Na)$. This compound is the disodium salt of an acid differing from the principal constituent of arsphenamine in the replacement of one hydrogen atom in each of the two amino groups by a methylenesulphonic group, the replacement being effected by treating the dihydrochloride of arsphenamine with formaldehyde and sodium acid sulphite.

Sulpharsphenamine occurs as a dry, yellow powder, freely mobile in contact with glass surfaces and without odour, except that due to traces of ether or alcohol. It is distributed in sealed glass phials from which the air has been evacuated or replaced by an inert gas. It contains, when determined by an approved method, not less than 18 per cent. and not more than 21 per cent. of As. The proportion of arsenic may be determined by the method given under Sodii Aminarsonas. The aqueous solution decolourises solution of iodine. It may be distinguished from neoarsphenamine by the absence of a precipitate on the addition of 1·5 millilitres of dilute hydrochloric acid to a solution of 0·5 gramme in 1·5 millilitres of water, but a yellow precipitate is produced in a few minutes on mixing a 10 per cent. w/v aqueous solution with five times its volume of dilute hydrochloric acid; when the acidified aqueous solution is boiled, sulphur dioxide is evolved. It may also be distinguished from neoarsphenamine by mixing a 10 per cent. w/v aqueous solution with an equal volume of 0·01 per cent. w/v aqueous solution of indigo carmine and maintaining the mixture at 50° for five minutes; the blue colour is not discharged. Sulpharsphenamine evolves formaldehyde when distilled with phosphoric acid as described under Neoarsphenamina. Sulpharsphenamine should be **stored** at a temperature below 15°. If it has become darker in colour, it should not be used.

Soluble in water; insoluble in alcohol (95 per cent.) and ether.

Standard, B.P.—Sulpharsphenamine is controlled by regulations made under the Therapeutic Substances Act, 1925. The standard preparation for Great Britain and Northern Ireland is a quantity of sulpharsphenamine kept in the National Institute for Medical Research, London. It complies with biological tests, carried out in an institution or laboratory approved by the licensing authority, for maximum toxicity and therapeutic potency. When 0·6 gramme of the powder is added to 1 millilitre of water, it dissolves rapidly and completely, forming a clear yellow solution free from suspended particles. No precipitate is produced on shaking a 10 per cent. w/v aqueous solution with an equal volume of N/1 sodium carbonate (absence of arsphenamine). The product in sealed phials, kept at a temperature of 56° for not less than twenty-four hours, retains its colour, physical properties and solubility.

Action and Uses.—Sulpharsphenamine possesses the spirochæticidal action of the arsphenamines. It has the advantage of being less toxic than arsphenamine and is the drug of choice for intramuscular injection because no local pain is produced. A further point of great importance is that, experimentally, it has proved more efficient in destroying trypanosomes introduced into the subarachnoid space, an observation which indicates its value in syphilitic affections of the central nervous system. For infants with congenital syphilis the intramuscular route is commonly employed, the dose being guaged by the weight and general condition, although acetarsol by mouth is often considered more satisfactory. Sulpharsphenamine which has become darker in colour should not be used. Solutions for **injection** may be prepared by dissolving the contents of a sealed container in the required quantity of sterile, freshly distilled water and should be used immediately.

Dose.– 0·1 to 0·6 gramme (1½ to 10 grains), by subcutaneous or intramuscular injection.

SULPHONAL
(Sulphonal)
Sulphonal

$C_7H_{16}O_4S_2 = 228·2$

Sulphonal is diethylsulphonedimethylmethane, $(CH_3)_2C(SO_2{\cdot}C_2H_5)_2$, and may be prepared by passing hydrogen sulphide into a mixture of anhydrous acetone and anhydrous mercaptan, whereby mercaptol, $(CH_3)_2C(SC_2H_5)_2$, is obtained as an oily liquid with a disagreeable odour; it is purified by washing with water and dilute sodium hydroxide solution and is then oxidised with a solution of potassium permanganate. The resulting sulphonal is purified by recrystallisation from water or alcohol.

Sulphonal occurs in colourless, odourless and almost tasteless, prismatic crystals or as a white powder; it is permanent in air. Sulphonal is a very stable body and is scarcely affected by acids or alkalis even on boiling, or by oxidising agents. It dissolves in sulphuric acid and is reprecipitated unchanged from the solution on diluting with water. When heated with carbon, mercaptan is produced and may be recognised by its unpleasant odour. Heated with reduced iron, it evolves a garlic-like odour and leaves a residue containing ferrous sulphide which may be recognised by adding hydrochloric acid, when hydrogen sulphide is evolved. Heated with a few drops of sulphuric acid and a trace of phenol, it becomes emerald-green in colour and gives off a strong sulphurous odour. Heated with anhydrous sodium acetate, hydrogen sulphide is evolved. When fused with three times its weight of potassium hydroxide, it becomes yellow, then red, and on diluting with water, a blue colouration results which, on adding hydrochloric acid, turns a transient violet with separation of sulphur.

Soluble in water (1 in 450), boiling water (1 in 15), alcohol (90 per cent.) (1 in 80), ether (1 in 90), chloroform (1 in 3), benzene (1 in 11) and light petroleum (about 1 in 1000).

Standard, B.P.—Sulphonal has a melting-point of 125° to 127°. Ash, not more than 0·05 per cent. It complies also with limit tests for free acid and for readily oxidisable substances.

Action and Uses.—Sulphonal is a pure hypnotic, possessing no analgesic properties and acting by virtue of its easy solubility in brain lipoid and insolubility in water. It is employed in simple insomnia when pain is absent. It is absorbed very slowly on account of its insolubility, and the dose should, therefore, be administered five or six hours before its hypnotic effect is desired. It is excreted even more slowly, and successive doses may have a cumulative effect and give rise to symptoms of poisoning. The hypnotic effect may also be prolonged, so that there is drowsiness on the day following its administration. Continued use of sulphonal may give rise to hallucinations, gastritis and liver damage, and to the destruction of hæmoglobin in the blood with the appearance of hæmatoporphyrin in the urine, which acquires a cherry-red colour. The urine of patients taking sulphonal has a distinct reducing action on Fehling's solution. The tendency to accumulate and to produce hæmatoporphyrinuria renders this drug one of the most dangerous hypnotics for other than occasional use.

Sulphonal is best **administered** in the form of a mixture, suspended with compound powder of tragacanth; the dose should be added to hot water with or without a little spirit. Taken in this way, its action is more rapid and a smaller dose suffices. It may also be dispensed as a powder to be swallowed with hot water or milk, or it may be enclosed in a cachet. When administered in tablets, they should be broken up or chewed, and swallowed with a draught of hot liquid. In cases of **poisoning** by sulphonal, alkaline liquids aid excretion.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

SULPHUR PRÆCIPITATUM

(Sulphur. Præcip.)

Precipitated Sulphur

S = 32·06

Synonym—Milk of Sulphur.

Precipitated sulphur may be prepared by boiling sublimed sulphur with calcium hydroxide and water for an hour or so, filtering, and decomposing the resulting complex solution of calcium polysulphides and thiosulphate by means of hydrochloric acid diluted with an equal volume of water and added in a thin stream with constant stirring until only a slight alkalinity remains. The precipitate is washed until the washings are tasteless and free from calcium, and is then dried rapidly at a moderate heat. By allowing the mixture to remain slightly alkaline, any arsenic which may have been present in the sulphur or the acid will remain in solution as a soluble thioarsenite. A mixture of precipitated sulphur and calcium sulphate prepared by precipitation with sulphuric acid is sometimes described as Lac Sulphuris.

Precipitated sulphur occurs as a soft, pale greyish-yellow or greenish-yellow powder, which is tasteless, free from grittiness and from any odour of hydrogen sulphide. It melts at about 115°, forming a yellow, mobile liquid which becomes dark and viscid on heating to about 160°. At higher temperatures, it burns with a blue flame and production of sulphur dioxide. It dissolves in hot aqueous solutions of alkali hydroxides with formation of polysulphides and thiosulphates.

Insoluble in water and alcohol (90 per cent.); almost completely soluble in carbon disulphide, the solution depositing the insoluble variety of sulphur on exposure to light; soluble in benzene, light petroleum, oil of turpentine, ether and chloroform.

Standard, B.P.—Precipitated sulphur leaves on ignition not more than 0·5 per cent. of residue. Examined microscopically, it is seen to consist of grouped amorphous globules without any crystalline particles. Arsenic limit, 5 parts per million. It complies also with a limit test for acidity.

Action and Uses.—When taken internally sulphur is partly absorbed as alkali sulphide from the intestine, the remainder being excreted in the fæces unchanged. Its action is entirely due to the sulphide formed, sulphur itself being an inert substance. It exerts a mild stimulant and antiseptic action in the intestine; it increases peristalsis and relaxes the bowels, producing a soft stool without causing pain or colic. The portion absorbed is excreted as sulphate in the urine; small quantities are also excreted by the lungs and by the skin, giving a disagreeable odour to the breath and perspiration. During excretion, sulphides increase the secretion of the bronchioles and skin.

Precipitated sulphur, mixed with milk, syrup, honey, or treacle, or as Confectio Sulphuris or Trochisci Sulphuris, is given to children for its

mildly laxative properties. It is applied to the skin in acne and other skin affections as Lotio Sulphuris. An emulsion of sulphur (Emulsio Sulphuris) for injection into sinuses is prepared by mixing precipitated sulphur, 1 part, with glycerin, 3 parts by weight, and 1 per cent. of phenol. Lotions of precipitated sulphur with lead acetate are sometimes employed to darken the colour of grey hair.

Dose.– 1 to 4 grammes ($\frac{1}{4}$ to 1 drachm).

Preparations

Confectio Sennæ et Sulphuris, B.P.C.—(Conf. Senn. et Sulphur.)—Confection of Senna and Sulphur. Equal parts of the confections of senna and sulphur. Dose.– 4 to 8 grammes (1 to 2 drachms).

Confectio Sulphuris, B.P.—(Conf. Sulphur.)—Confection of Sulphur. Precipitated sulphur, about 40 per cent. w/w, and potassium acid tartrate, about 10 per cent. w/w, mixed with tragacanth, syrup, tincture of orange and glycerin. Dose.– 4 to 8 grammes (1 to 2 drachms).

Lotio Sulphuris, B.P.C.—(Lot. Sulphur.)—Sulphur Lotion. Precipitated sulphur, about 7 per cent. w/v, with glycerin, alcohol (90 per cent.), rose water and solution of calcium hydroxide.

Trochisci Sulphuris, B.P.C.—(Troch. Sulphur.)—Sulphur Lozenges. Each lozenge contains 5 grains of precipitated sulphur.

This lozenge, containing 0·3 gramme of precipitated sulphur, was included in the British Pharmacopœia, 1914.

SULPHUR SUBLIMATUM

(Sulphur. Sublim.)

Sublimed Sulphur

S = 32·06

Synonym—Flowers of Sulphur.

Sublimed sulphur is prepared by sublimation from sulphur which may be obtained from deposits of native sulphur occurring in volcanic districts of Italy and Sicily, but the bulk of the world's supply is derived from deposits in Louisiana where it has probably been formed by the action of bituminous matter and the atmosphere on calcium sulphate. In Sicily, it is extracted from the associated mineral matter by fusion and subsequent distillation. The deposits in Louisiana cannot be mined by ordinary methods owing to the presence of hydrogen sulphide and sulphur dioxide and to the fact that the deposit is covered with a quicksand. The sulphur is therefore extracted by pumping superheated steam into the deposit and raising the molten sulphur to the surface by means of compressed air. It is then allowed to solidify and reduced to powder or sublimed. For pharmaceutical purposes, crushed lump sulphur must not be used; it may be distinguished by its microscopical characters and its almost complete solubility in carbon disulphide.

Sublimed sulphur occurs as a fine, yellow, slightly gritty powder. It is odourless and tasteless when pure, but medicinal sublimed sulphur has a distinctly characteristic odour and a faintly acid taste. On exposure to moist air, it is gradually oxidised with formation of sulphuric acid. It burns with a blue flame and production of sulphur dioxide. Sublimed sulphur melts at about 115°, forming a yellow, mobile liquid; on further heating, it becomes dark and viscid at about 160° and boils at 440°.

Partly **soluble** in carbon disulphide; insoluble in water and alcohol (90 per cent.).

Standard, B.P.—Sublimed sulphur leaves on ignition not more than 0·25 per cent. of residue. Examined microscopically, it is seen to consist chiefly of almost opaque, rounded, amorphous particles or aggregates, occasionally associated with semi-crystalline masses. Arsenic limit, 5 parts per million. It complies also with limit tests for acidity and for matter soluble in carbon disulphide.

Action and Uses.—Sublimed sulphur resembles precipitated sulphur in its general properties and is used as a laxative, often with senna (as in Pulvis Glycyrrhizæ Compositus). It is much used in chronic skin diseases, gout, rheumatism and chronic bronchitis. Intramuscular injections of a 1 to 8 per cent. emulsion of sulphur in oil, repeated at intervals of five to six days, have been used to induce pyrexia in the treatment of arthritis and general paralysis. The administration of a full dose of sulphur nightly to patients before and while undergoing mercurial treatment for syphilis is found to prevent mercurial stomatitis.

Sulphur is used externally in the form of ointment and lotion as a mild antiseptic and parasiticide in scabies, acne and other skin diseases. When dusted between the toes, sublimed sulphur destroys the fungus producing epidermomycosis. The fumes of burning sulphur are employed as a disinfectant to prevent the spread of infectious diseases; for this purpose it is moulded into flat, circular cakes which are provided with a wick. From 2 to 4 pounds of sulphur should be burned for each 1000 cubic feet of air space.

Dose.– 1 to 4 grammes (¼ to 1 drachm).

SULPHUR LOTUM.—Washed sulphur is prepared by digesting sublimed sulphur with water and solution of ammonia for twenty-four hours, with occasional agitation, after which it is washed with water until the washings are neutral. The washed sulphur is then pressed, thoroughly dried at a moderate heat, and passed through a fine sieve. It occurs as a bright greenish-yellow, tasteless and odourless powder. Unless it has been thoroughly dried after washing, it slowly oxidises and again becomes acid. Dose.– 1 to 4 grammes (¼ to 1 drachm).

SULPHUR NIGRUM.—Black sulphur was formerly the grey or mouse-coloured, crude natural sulphur obtained from Sicily, but the name is now applied to the residuum from the subliming pots used in the preparation of flowers of sulphur, or to a mixture of sublimed sulphur and charcoal. It occurs as a dark grey or blackish powder. Black sulphur is used chiefly in veterinary medicine.

Preparations

Confectio Guaiaci Composita, B.P.C.—(Conf. Guaiac. Co.)—Compound Confection of Guaiacum. *Syn.*—Chelsea Pensioner. Guaiacum resin, 1 per cent., rhubarb, 2 per cent., and sublimed sulphur, 14·5 per cent., with potassium acid tartrate, nutmeg and purified honey. Dose.—4 to 8 grammes (1 to 2 drachms).

Tabellæ Guaiaci et Sulphuris, B.P.C.—(Tab. Guaiac. et Sulphur.)—Tablets of Guaiacum and Sulphur. Each tablet contains 3 grains of sublimed sulphur and 3 grains of guaiacum resin. Dose.—1 to 3 tablets.

Unguentum Sulphuris, B.P.—(Ung. Sulphur.)—Ointment of Sulphur. *Syn.*—Sulphur Ointment. Sublimed sulphur, 10 per cent., in simple ointment.

Unguentum Sulphuris Camphoratum, B.P.C.—(Ung. Sulphur. Camph.)—Camphorated Sulphur Ointment. Sublimed sulphur, 2 per cent., with phenol, resorcinol, camphor and solution of coal tar, in lard and white soft paraffin.

Unguentum Sulphuris Compositum, B.P.C.—(Ung. Sulphur. Co.)—Compound Sulphur Ointment. Sublimed sulphur and tar, of each 15 per cent., and calcium carbonate, 10 per cent., in lard and soft soap.

Unguentum Sulphuris et Resorcinolis, B.P.C.—(Ung. Sulphur. et Resorcin.). *Syn.*—Unguentum Sulphuris et Resorcini; Sulphur and Resorcin Ointment. Sulphur and Resorcinol Ointment. Sublimed sulphur, 4·5 per cent., and resorcinol, 3 per cent., in yellow soft paraffin.

SULPHURIS CHLORIDUM

(Sulphur. Chlorid.)

Sulphur Chloride

$S_2Cl_2 = 135·0$

Synonym—Sulphur Monochloride.

Sulphur chloride is prepared by the direct combination of chlorine with sulphur. It occurs as a reddish-yellow, mobile liquid with a disagreeable, penetrating odour. Specific gravity, about 1·70; boiling-point, about 138°; solidifying-point, about —80°. It readily dissolves sulphur and is slowly decomposed by water, forming hydrochloric acid, sulphurous acid and sulphur. It reacts with carbon disulphide to form carbon tetrachloride and free sulphur, and with ethylene, yielding mustard gas and sulphur.

Soluble in benzene; decomposed by water, alcohol and ether.

Action and Uses.—Sulphur chloride is an ingredient of Unguentum Sulphuris Hypochloritis, which has been used in the treatment of acne, psoriasis and scabies.

Preparation

Unguentum Sulphuris Hypochloritis, B.P.C.—(Ung. Sulphur. Hypochlor.)—Sulphur Hypochlorite Ointment. Sublimed sulphur, 12 per cent., and sulphur chloride, 2 per cent., with oil of bitter almond, in lard.

SULPHURIS IODIDUM
(Sulphur. Iod.)
Sulphur Iodide

Synonym—Sulphur Subiodide.

Sulphur iodide may be prepared by thoroughly mixing together 4 parts of iodine and 1 part of sulphur and heating the mixture gently until the mass assumes a uniformly dark colour, increasing the temperature until liquefaction ensues, allowing the mass to cool and reducing the sulphur iodide to fragments of a convenient size. It occurs as a greyish-black, crystalline solid with an odour resembling that of iodine. Iodine is evolved when sulphur iodide is boiled with water. It should be **stored** in well-closed containers.

Insoluble in water; soluble in glycerin (1 in 16), and carbon disulphide (1 in 4).

Standard.—Sulphur iodide contains not less than 70 per cent. of I.

Assay.—Triturate about 0·5 gramme, accurately weighed, with 20 millilitres of potassium iodide solution, and titrate the mixture with N/10 sodium thiosulphate, using starch solution as indicator; each millilitre of N/10 sodium thiosulphate solution is equivalent to 0·01269 gramme of I.

Action and Uses.—The action of sulphur iodide is virtually that of iodine; it is employed as Unguentum Sulphuris Iodidi in acne rosacea, and for ringworm, scabies and other parasitic diseases of the skin.

Preparation

Unguentum Sulphuris Iodidi, B.P.C.—(Ung. Sulphur. Iod.)—Sulphur Iodide Ointment. Sulphur iodide, 4 per cent., in glycerin and simple ointment.

SUMBUL
(Sumb.)
Sumbul

Synonyms—Sumbul Root; Musk Root.

Sumbul consists of the transversely sliced and dried root or rhizome of *Ferula Sumbul* Hook. f. and other species of *Ferula* (Fam. Umbelliferæ), plants of considerable size growing in Turkestan.

The drug occurs in more or less cylindrical or tapering pieces which are remarkable on account of their extreme lightness. They vary from about 3 to 10 centimetres in diameter and from 2 to 6 centimetres in thickness, often dividing in the upper part into two or more branches. Externally, they are covered with a thin, tough cork which is dark brown in colour, transversely wrinkled and can be stripped off easily. Pieces of

the rootstock bear encircling scars of fallen leaves which are beset with coarse fibres derived from the fibrovascular strands. Internally, the drug is spongy and coarsely fibrous, yellowish-white in colour, and frequently shows spots of exuded resin; it does not exhibit any well-defined structure. A transverse section of a small rhizome shows a pale bark, within which is a ring of narrow, yellowish, wood bundles; the central portion consists of parenchyma, through which vascular bundles pass in various directions. In large pieces the structure is less distinct. The drug has a bitter taste and a faint, musky odour. It **contains** a volatile oil, an aromatic resin having a bitter taste, and a yellow, viscid fixed oil; in addition it contains free umbelliferone.

Substitutes.—False sumbul is the root of *Dorema Ammoniacum* D. Don. It has a closer texture and a reddish or yellowish colour. There is reason to suppose that much of the commercial drug is obtained from *Ferula suaveolens* Aitchison and Hemsley. This root resembles that of *Ferula Sumbul*, but is devoid of the characteristic musky odour.

Action and Uses.—Sumbul is occasionally employed as a stimulant and antispasmodic in hysterical conditions, usually with preparations of valerian. It is generally prescribed in the form of tincture which requires the addition of mucilage of acacia to suspend the resin.

Preparation

Tinctura Sumbul, B.P.C.—(Tinct. Sumb.)—Tincture of Sumbul. 1 in 10. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SUPRARENALUM

(Supraren.)

Suprarenal

Synonyms—Dry Suprarenal Gland; Suprarenal Siccum; Desiccated Suprarenal.

Suprarenal consists of the clean, dried and powdered suprarenal glands obtained from oxen and other mammals. The suprarenal glands are situated above the kidneys. Each gland consists of two parts, an outer cortex and an inner medulla. From the cortex extract of suprarenal cortex may be prepared; from the medulla adrenaline may be obtained. The fresh gland yields about one-sixth of its weight of suprarenal.

Action and Uses.—Suprarenal has been used in doses of 0·06 to 0·3 gramme (1 to 5 grains) in conjunction with injections of adrenaline for the treatment of Addison's disease, but it is now being replaced by Extractum Suprarenali Corticis. Its mode of action is not understood, except that it replaces the natural secretions of the suprarenal glands, which are deficient in Addison's disease. There is evidence that the suprarenal gland has an intimate connection with sodium metabolism.

SYMPHYTUM
(Symphyt.)

Comfrey

Synonyms—Symphyti Radix; Comfrey Root.

Comfrey consists of the dried root and rhizome of *Symphytum officinale* Linn. (Fam. Boraginaceæ), a widely distributed perennial herb. It is cultivated in Britain and in the United States of America.

The drug consists mainly of segments of the dried root, and occurs in cylindrical pieces from about 10 to 40 millimetres in length and about 5 to 10 millimetres in diameter. Externally, it is nearly black in colour and exhibits glistening crystals on the surface; it is strongly wrinkled longitudinally. The fracture is short, the fractured surface being greyish-white and horny. The smoothed, transverse surface shows a narrow bark, separated by a dark cambium line from the radiate wood, which is composed of narrow bundles separated by wide medullary rays. It has a mucilaginous taste but is without odour.

Comfrey **contains** allantoin, 0·6 to 0·8 per cent., gum, tannin, resin and a trace of starch.

Action and Uses.—The healing action of comfrey has been attributed to the presence of allantoin, which has acquired some reputation as a cell proliferant. Comfrey has been used as an application to wounds, sores and ulcers of various kinds, a mucilaginous decoction of fresh root, peeled and bruised into a pulp, being applied. A decoction has also been given internally in gastralgia and gastric ulcer.

SYMPHYTI FOLIUM.—Comfrey leaf consists of the dried leaves of *S. officinale*. The leaves are broadly lanceolate, often 20 to 25 centimetres in length. The apex is acute and the margin slightly wavy. The leaves are green or brownish-green in colour and extremely rough, due to the presence of numerous short, stiff hairs. The lower leaves are petiolate, and the upper leaves sessile and decurrent along the stem. The microscopical characters are stomata of the cruciferous type on both surfaces; the numerous thick-walled hairs, frequently one-celled, but sometimes with a short basal cell, very sharply pointed, and many, especially those on the lower surface, strongly curved at the tip in the form of a hook; the small, spherical-headed cystolith hairs with unicellular stalks; the slightly wavy-walled, epidermal cells.

TABACUM
(Tabac.)

Tobacco

Tobacco consists of the leaves obtained from *Nicotiana Tabacum* Linn. (Fam. Solanaceæ), a large herb indigenous to America and cultivated in temperate and subtropical countries. The leaves are collected, allowed to wilt, and are then heaped and covered with mats upon which the moisture given off by the leaves condenses. When this "sweating"

process is completed, the leaves are tied into bundles and packed in heaps. The temperature of the heaps rises rapidly and is kept as near as possible to 50° by turning them. The leaves are finally dried.

The leaves are ovate, ovate-lanceolate, or oblong-ovate, brown, and sometimes exceed 50 centimetres in length. The margin is entire, the apex acute, the surface glandular and hairy, and the texture brittle. The venation is pinnate, the lateral veins anastomosing near the margin, and the base is decurrent. The odour is characteristic and the taste nauseous, bitter and acrid.

The diagnostic **microscopical** characters are the stomata of the cruciferous type; the numerous hairs, some of which are glandular, with unicellular or uniseriate stalks, and others are covering hairs, uniseriate or occasionally branched, with acute terminal cells; the sandy crystals of calcium oxalate.

Tobacco **contains** from 1 to 8 per cent. of nicotine. It also contains small quantities of the following bases: nicotinine, nicoteine, *iso*nicoteine, nicotoine, nicotelline, pyrrolidine, N-methylpyrroline; traces of resin and volatile oil are also present.

Action and Uses.—Tobacco is rarely used in medicine. When tobacco is smoked, the nicotine and other substances are partly decomposed into pyridine, furfurol, collidine, hydrocyanic acid, carbon monoxide and other bodies, to which the poisonous effect of tobacco smoke is mainly due. Many explanations of the soothing effect of smoking upon the nervous system have been put forward, but agreement is general only in the statement that it is not entirely due to the action of nicotine. Over-indulgence in smoking gives rise to hoarseness and cough, due to congestion of the throat and air-passages. In more severe cases there is a feeble and intermittent action of the heart, depression of the central nervous system, impaired memory, dimness of vision, loss of colour perception, and tremors. The effect of cigar smoking on those who are not accustomed to it is to constrict blood vessels, increase intestinal movements and raise blood pressure; these effects continue for about twenty minutes, during which time the blood pressure may be raised by from 10 to 40 millimetres of mercury. Collapse then ensues, respiration becomes very feeble, the patient breaks out into a cold sweat, and blood pressure falls by from 30 to 50 millimetres of mercury. These effects are probably due to the stimulant action of the nicotine on nerve cells, followed later by the paralytic effect. Those accustomed to tobacco smoking experience none of these symptoms because their tissues are able to oxidise a certain amount of nicotine. In cigarette smoking, carbon monoxide is formed plentifully and, if inhaled, is absorbed owing to its great affinity for hæmoglobin, so that a smoker of 25 cigarettes a day may have 5 per cent. of his hæmoglobin temporarily thrown out of use.

Preparations of tobacco and crude solutions of nicotine are used as insecticides in horticulture by dusting or spraying, or by vaporisation. In cases of **poisoning** by preparations of tobacco, the treatment described under Nicotina should be adopted.

TALCUM PURIFICATUM
(Talc. Pur.)
Purified Talc

Synonyms—Powdered Talc; Creta Gallica Purificata; Purified French Chalk.

Purified talc is a native magnesium silicate, $Mg_6(Si_2O_5)_4(OH)_4$, purified by boiling with dilute hydrochloric acid, decanting the liquid, washing the residue with water and drying at 110°. It occurs as a very fine, white, tasteless and odourless powder, and sometimes contains a small amount of aluminium silicate. Specific gravity, about 2·2 to 2·8. When rubbed on the skin it imparts a feeling of greasiness.

Insoluble in water and dilute solutions of acids and alkali hydroxides.

Standard.—Purified talc loses, on ignition at a red heat, not more than 1 per cent. of its weight. The solution obtained by boiling 5 grammes with 25 millilitres of water for thirty minutes, replacing any water lost by evaporation, and filtering, adding 5 millilitres of nitric acid, and diluting to 50 millilitres, complies with the limit test for iron (limit of water-soluble iron salts). 5 grammes, boiled with 25 millilitres of water for thirty minutes and filtered, produces a filtrate which is neutral to litmus and which, on evaporation, yields not more than 0·005 gramme of residue. On digesting 2 grammes with 40 millilitres of dilute hydrochloric acid for fifteen minutes, filtering and evaporating the filtrate and igniting, not more than 0·01 gramme of residue remains.

Action and Uses.—Purified talc is used as a dusting powder to allay irritation and prevent chafing from friction; for this purpose it is often mixed with zinc oxide, boric acid, or starch, and suitably perfumed. It is also used as an aid in filtering liquids containing finely divided matter in suspension, as a lubricant to facilitate massage operations, and sometimes as a lubricant in tablet making.

TAMARINDUS
(Tamarind.)
Tamarind

Tamarind consists of the fruits of *Tamarindus indica* Linn. (Fam. Leguminosæ), freed from the brittle outer part of the pericarp and preserved with sugar. The tamarind tree is indigenous to Africa, but is cultivated in India and the West Indies. The pod is about 20 centimetres long and 2 centimetres wide and consists of a rough, brownish, rather thin epicarp, a fleshy mesocarp and a leathery endocarp covering each of the 3 to 6 seeds. From the stalk, down the two margins and the midrib, run strong fibrous vascular strands, with finer lateral branches.

The pods, freed from their epicarps, are preserved by pouring hot cane-sugar syrup on them. Copper vessels must not be used for preparing or storing tamarind.

Tamarind is a dark, reddish-brown, moist, sugary mass, in which are embedded the fibrous strands and the large reddish-brown, glossy seeds which are hard and exendospermous, usually sub-quadrangular in shape (about 15 by 12 by 5 millimetres), and enclosed in the tough endocarp. The taste is pleasantly acid and sweet, and the odour is fragrant and fruity.

Tamarind **contains** tartaric acid, potassium acid tartrate and invert sugar. The total acidity varies from 5 to 8 per cent., calculated as tartaric acid. In addition to these constituents it contains the sugar which has been used in the form of syrup to preserve the pulp.

Substitute.—East Indian tamarind consists of the pulp of the fruit pressed into a firm, black mass, with or without the addition of sugar or salt as a preservative, and containing portions of the epicarp in addition to the seeds and fibres. Its acidity varies from 11 to 13 per cent., calculated as tartaric acid.

Standard, B.P.—Tamarind yields no reactions characteristic of copper.

Action and Uses.—Tamarind is mildly laxative; it is an ingredient of Confectio Sennæ.

TARAXACUM
(Tarax.)

Taraxacum

Synonyms—Taraxacum Root; Taraxaci Radix; Dandelion Root.

Taraxacum is the fresh or dried root of *Taraxacum officinale* Wiggers (Fam. Compositæ). It is collected in the autumn.

The fresh root is yellowish-white in colour externally and often 30 centimetres or more in length and 12 to 25 millimetres in diameter. Internally, it is whitish and fleshy, and from the freshly cut surface a bitter, milky juice exudes, which may be observed to arise from concentric rings of tissue; a small yellow wood is found in the centre. The dried root is dark greyish-brown, much shrivelled and wrinkled longitudinally and nearly cylindrical in shape. The upper part passes into a short, vertical rhizome which frequently branches, the summit of each bearing the short remains of leaves, near the insertion of which brownish hairs may be seen. The root breaks with a short fracture, the fractured surface showing a narrow cork, a wide phloem in which are numerous, dark, concentric rings marking the position of laticiferous vessels, and a small, porous, yellow wood. The rhizome shows a small pith, and the yellow wood ring is broken at intervals. The drug has a bitter taste, but is without odour.

Taraxacum **contains** a small quantity of the crystalline, bitter substance, taraxacin, together with choline, resin, the phytosterols, taraxasterol

and homotaraxasterol, various fatty acids and variable quantities of sugar and inulin. In the fresh root the inulin is dissolved in the cell sap, but in the dried root it forms amorphous irregular lumps not readily soluble in cold water. The autumnal root has been found to contain 25 per cent. of inulin, whereas the spring root contained 18 per cent. of lævulin and 17 per cent. of uncrystallisable sugar. The dried root yields to alcohol (20 per cent.) about 40 per cent. of extractive.

Action and Uses.—Taraxacum is used as a bitter in atonic dyspepsia, and as a mild laxative in habitual constipation; it has no action on the liver. It is administered as extract, liquid extract and juice.

Preparations

Extractum Taraxaci, B.P.C.—(Ext. Tarax.)—Extract of Taraxacum. A soft extract prepared from the juice of the fresh drug. Dose.—0·3 to 1 gramme (5 to 15 grains).

This extract was included in the British Pharmacopœia, 1914.

Extractum Taraxaci Liquidum, B.P.C.—(Ext. Tarax. Liq.)—Liquid Extract of Taraxacum. 1 in 1, prepared from the dried root. Dose.—2 to 8 millilitres (½ to 2 fluid drachms).

Succus Taraxaci, B.P.C.—(Succ. Tarax.)—Juice of Taraxacum. The juice expressed from fresh taraxacum root, mixed with one-third its volume of alcohol (90 per cent.). Dose.—4 to 8 millilitres (1 to 2 fluid drachms).

This juice was included in the British Pharmacopœia, 1914.

TARTRAZINA

(Tartrazin.)

Tartrazine

$$C_{16}H_9O_9N_4S_2Na_3 = 534{\cdot}2$$

Tartrazine (Colour Index No. 640) is the sodium salt of 4-*p*-sulphobenzeneazo-1-*p*-sulphophenyl-5-hydroxypyrazole-3-carboxylic acid, and may be prepared by the condensation of 2 molecules of phenylhydrazine-*p*-sulphonic acid with 1 molecule of dihydroxytartaric acid. It occurs as an orange-yellow powder and usually contains a large proportion of sodium chloride. The colour of the aqueous solution is unaltered on the addition of hydrochloric acid, becomes orange-yellow with sulphuric acid and reddish-yellow with sodium hydroxide. It is readily reduced by titanous chloride.

Soluble in water yielding a golden-yellow solution; incompletely soluble in alcohol.

Standard.—Tartrazine leaves not more than 80 per cent. of sulphated ash. Arsenic limit, 5 parts per million. Lead limit, 50 parts per million. Dissolve the sulphated ash from 1 gramme in 20 millilitres of water and 2 millilitres of dilute hydrochloric acid, and add 1 millilitre of potassium ferrocyanide solution; no precipitate is obtained (limit of zinc).

Uses.—Tartrazine is practically unaffected by acids and alkalis, or by light. It is used for colouring lemonade and lemonade powders, the proportion being such that the product will contain about 2 parts per million. In combination with orange G, as in Liquor Tartrazinæ Compositus, it forms a useful substitute for the colouring matter of saffron in medicines and foods. The addition of 5 minims of Liquor Tartrazinæ Compositus to each fluid ounce of a colourless liquid imparts a stable, saffron-like colour equivalent to that produced by 25 minims of glycerin of saffron or 12½ minims of freshly prepared tincture of saffron. Tartrazine is also used in the manufacture of photographic light filters and of self-screened photographic emulsions.

Preparation

Liquor Tartrazinæ Compositus, B.P.C.—(Liq. Tartrazin. Co.)—Compound Solution of Tartrazine. *Syn.*—Liquor Flavus. Tartrazine, 0·75 per cent. w/v, and orange G, 0·25 per cent. w/v, in glycerin and chloroform water.

TEREBENUM

(Tereben.)

Terebene

Terebene is a mixture of dipentene and other hydrocarbons obtained by shaking oil of turpentine with sulphuric acid, added in successive small quantities, and distilling the separated product in a brisk current of steam. It occurs as a colourless or very pale yellow liquid, having an agreeable, characteristic odour and an aromatic, terebinthinate taste.

Soluble in alcohol (90 per cent.) (1 in 5); almost insoluble in water; miscible with dehydrated alcohol, ether and chloroform.

Standard, B.P.—Terebene has a specific gravity of 0·862 to 0·870. Optical rotation, −2° to +2°. Refractive index at 20°, 1·471 to 1·474. It distils between 160° and 190°, leaving only a slight viscous residue; not less than 80 per cent. v/v distils between 165° and 185°. Residue on rapid evaporation in a flat dish on a water-bath, not more than 2 per cent. w/w.

Action and Uses.—Terebene closely resembles oil of turpentine in its properties, but its odour is more agreeable. A few drops sprinkled in the room act as a deodorant. It stimulates secretion by the respiratory mucous membrane during its excretion, and is used as an antiseptic and expectorant either taken internally or as an inhalation; it is more especially prescribed in chronic bronchitis, winter cough and phthisis. When taken internally in large doses it may give rise to albuminuria and hæmaturia. It may be **administered** on sugar or enclosed in gelatin capsules; lozenges and pastilles are also prepared. For ordinary administration in mixture form, an emulsion may be prepared by the

usual process for volatile oils. Terebene is used as an inhalation from an oro-nasal respirator; or a suspension in water (1 in 12) may be made with magnesium carbonate and added to hot water.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

TEREBINTHINA CANADENSIS

(Tereb. Canad.)

Canada Balsam

Synonyms—Canada Turpentine; Balsam of Fir.

Canada balsam is an oleo-resin from the balsam fir, *Abies balsamea* Mill. (Fam. Pinaceæ), indigenous to Canada and the Northern United States of America and collected chiefly in Quebec. The oleo-resin is secreted in schizogenous ducts in the bark and collects in cavities which form blisters on the surface; these are punctured, and the oleo-resin collected.

The oleo-resin forms a pale yellow, viscid liquid, often exhibiting a slight green fluorescence. The odour is agreeable and terebinthinate, and the taste is bitter and acrid. It becomes more viscid on keeping, and dries to a hard, transparent varnish that shows little disposition to crystallise. It solidifies when mixed with about one-sixth of its weight of heavy magnesium oxide and a little water (distinction from other coniferous resins). It is soluble in all proportions of benzene, xylene, chloroform and ether, freely soluble in oil of turpentine, and about 80 per cent. soluble in alcohol (90 per cent.).

Canada balsam **contains** a bitter principle which is soluble in water, but consists essentially of a mixture of about 66 per cent. of resin and about 33 per cent. of volatile oil which consists chiefly of *l*-α-pinene. The resin contains about 20 per cent. of an indifferent resene (canadoresene), 20 per cent. of amorphous canadinic acid, and 60 per cent. of amorphous α- and β-canadolinic acids, with which is associated a trace of crystalline canadolic acid. The specific gravity of canada balsam is about 0·987 to 0·994; optical rotation, +1° to +4°; refractive index at 20°, 1·520 to 1·523; acid value, 80 to 90.

Substitute.—Oregon balsam is obtained from the Douglas fir, *Pseudotsuga taxifolia* (Lamb.) Britton, and can be distinguished by its failure to respond to the magnesium oxide test.

Standard.—Canada balsam remains clear when cooled to 10° (absence of excess of moisture).

Action and Uses.—Canada balsam is not given internally. It is used in microscopy as a mounting medium. For this purpose the balsam is warmed in an open dish until a portion of the mass, transferred to a slab, sets to a brittle solid. It is then dissolved in an equal quantity of xylene or other suitable solvent. Such a solution forms a

non-crystallising mounting medium, having a refractive index approximating to that of ordinary glass and therefore involving a minimum dispersion of light.

TERPINI HYDRAS

(Terpin. Hydr.)

Terpin Hydrate

$C_{10}H_{20}O_2,H_2O = 190{\cdot}2$

Synonym—Terpene Hydrate.

Terpin hydrate, $C_{10}H_{18}(OH)_2,H_2O$, is the hydrate of terpin, $C_{10}H_{18}(OH)_2$, and may be prepared by the action of nitric acid on a mixture of alcohol and oil of turpentine. It may be purified by recrystallisation from alcohol. Terpin hydrate occurs in the form of colourless, glistening, rhombic prisms or as a crystalline powder having a slightly aromatic odour and a somewhat bitter taste; it is optically inactive. It melts with loss of water of crystallisation; when heated at 100° it sublimes in fine needles, without decomposition. When a few drops of sulphuric acid are added to its hot aqueous solution, the liquid becomes turbid and acquires a very pleasant odour of lilac, due to the formation of terpineol. Terpin hydrate is rendered anhydrous over sulphuric acid, yielding terpin. Terpin melts at 102° to 103°, and sublimes at 258° without decomposition. Terpin hydrate should be **stored** in a cool place.

Soluble in water (1 in 280), boiling water (1 in 32), alcohol (90 per cent.) (1 in 14), boiling alcohol (1 in 2), alcohol (60 per cent.) (1 in 46), ether (about 1 in 100) and chloroform (1 in 200); slightly soluble in ethereal oils; insoluble in light petroleum.

Standard.—Terpin hydrate melts between 116° and 119°. Ash, not more than 0·05 per cent. It has no odour of oil of turpentine. The hot aqueous 1 per cent. w/v solution is not acid to litmus.

Action and Uses.—The action of terpin hydrate closely resembles that of oil of turpentine. It is used to lessen cough and expectoration in phthisis and chronic bronchitis and for this purpose may be **administered** in pills massed with glycerin of tragacanth, or as an elixir.

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

TERPINEOL.—Terpineol, $C_{10}H_{17}OH$, is a product of the fractional distillation of terpinol, and may be prepared by treating terpin hydrate with 0·1 per cent. sulphuric acid. Terpineol occurs usually as a colourless, viscid liquid, having a strong, pleasant odour of hyacinth and lilac, and a bitter, feebly pungent taste. Specific gravity, about 0·94; boiling-point, about 216°. Optically inactive. It should be stored in well-stoppered, dark-coloured bottles. It is insoluble in water, and soluble in alcohol and ether. Terpineol is used largely in soap-making and perfumery.

TERPINOL.—Terpinol, $C_{10}H_{16}$, is a mixture of several terpenes such as terpinene, terpinolene and dipentene, with variable proportions of oxygenated

bodies (terpineol and cineole), prepared by distilling 1 part of terpin hydrate with 5 parts of 10 per cent. sulphuric acid. The colourless or nearly colourless liquid, with a strong odour of hyacinth, passes over between 160° and 220°. It is insoluble in water, and readily soluble in alcohol and ether. Terpinol has been given internally in place of terpin hydrate. It is used in soap-making and perfumery.

Preparations

Elixir Æthylmorphinæ et Terpini, B.P.C.—(Elix. Æthylmorph. et Terpin.)—Elixir of Ethylmorphine and Terpin. Each fluid drachm contains approximately $\frac{1}{8}$ grain of ethylmorphine hydrochloride and $\frac{5}{15}$ grain of terpin hydrate, with alcohol (90 per cent.), glycerin and syrup of wild cherry. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Elixir Diamorphinæ et Pini Compositum, B.P.C.—(Elix. Diamorph. et Pini Co.)—Compound Elixir of Diamorphine and Pine. Each fluid drachm contains approximately $\frac{1}{3\cdot6}$ grain of diamorphine hydrochloride and $\frac{5}{15}$ grain of terpin hydrate, with oil of pumilio pine, alcohol (90 per cent.), compound solution of tartrazine, glycerin and sucrose. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Elixir Diamorphinæ et Terpini, B.P.C.—(Elix. Diamorph. et Terpin.)—Elixir of Diamorphine and Terpin. Each fluid drachm contains approximately $\frac{1}{15}$ grain of diamorphine hydrochloride and $\frac{5}{15}$ grain of terpin hydrate, with alcohol (90 per cent.), glycerin and syrup of wild cherry. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Elixir Diamorphinæ et Terpini cum Apomorphina, B.P.C.—(Elix. Diamorph. et Terpin. c. Apomorph.)—Elixir of Diamorphine and Terpin with Apomorphine. Each fluid drachm contains $\frac{1}{20}$ grain of diamorphine hydrochloride and $\frac{5}{15}$ grain of terpin hydrate, with apomorphine hydrochloride, alcohol (90 per cent.), glycerin and syrup of wild cherry. Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

TETRACHLORETHYLENUM

(Tetrachlorethylen.)

Tetrachlorethylene

$C_2Cl_4 = 165{\cdot}8$

Synonym—Perchlorethylene.

Tetrachlorethylene, $CCl_2{:}CCl_2$, may be prepared by treating pentachlorethane, C_2HCl_5, with milk of lime. It is a colourless, mobile liquid with an odour somewhat resembling that of carbon tetrachloride.

Insoluble in water; miscible with alcohol, ether and oils.

Standard.—Tetrachlorethylene boils between 117° and 122°. Specific gravity, 1·61 to 1·63. It complies with the limit tests for non-volatile residue, sulphur compounds, free chlorine and ionisable chlorides in Carbonei Tetrachloridum.

Action and Uses.—Tetrachlorethylene is used for the expulsion of hook-worms from man and animals; it is also useful against round-worms in animals. It may be administered in gelatin capsules. For the treatment of ankylostomiasis, it may be given in doses totalling 3, 4 and 5 millilitres on each of three consecutive days. The dose should be divided into portions of 1 millilitre each, given at intervals of one hour, and on the third day, about three hours after taking the last dose, a purge of

sodium sulphate should be administered. For debilitated patients the dose should not be more than 3 millilitres a day. During the treatment patients should be kept at absolute rest, they should avoid alcoholic drinks and take liberal quantities of milk. No serious ill effects have been noted during treatment, although some patients have experienced a transitory sensation of unsteadiness and vertigo immediately after taking the capsules. Although the drug is eliminated by the kidneys, albuminuria has never been noted. Tetrachlorethylene is less toxic than carbon tetrachloride; it does not produce liver damage. It has not been shown to have any action on the liver-fluke. Tetrachlorethylene is also used as a solvent for cellulose acetate in the manufacture of lacquers.

Dose.– 1 millilitre (15 minims).

PENTACHLORETHANUM.—Pentachlorethane, $CHCl_2 \cdot CCl_3$, may be obtained by the catalytic chlorination of trichlorethylene, and occurs as a colourless, non-inflammable, toxic liquid, having a specific gravity of 1·685 to 1·709, and a boiling-point of about 179°. It is used as a solvent in the manufacture of lacquers and varnishes.

TETRACHLORETHANUM.—Tetrachlorethane, $CHCl_2 \cdot CHCl_2$, or acetylene tetrachloride, is a colourless liquid, having an odour resembling that of chloroform. Specific gravity, about 1·60. Boiling-point, about 146°. Tetrachlorethane is three to four times as toxic as chloroform. It should be used only in enclosed apparatus or in well-ventilated spaces. Toxic effects are shown by abnormal fatigue, nervousness, loss of appetite, nausea and vomiting, and, in severe cases, by jaundice and enlargement of the liver. It is used as a solvent for cellulose acetate, bitumen, waxes, resins, tar, pitch, sulphur and rubber. It is employed as a fumigant for the destruction of "white fly" in greenhouses; for 1000 cubic feet, 10 fluid ounces is allowed to volatilise.

TRICHLORETHYLENUM.—Trichlorethylene, $CHCl:CCl_2$, has similar properties to tetrachlorethylene. Specific gravity, about 1·47. Boiling-point, about 88°. Trichlorethylene appears to have some selective action on the sensory endings of the trigeminal nerve and has been used in trigeminal neuralgia. Different individuals show wide differences in susceptibility to its actions; hence the dose necessary to afford relief varies. Therapeutic doses sometimes cause transitory giddiness, palpitation and nausea. It is administered by inhalation, 10 to 20 drops being inhaled from cotton wool. This may be repeated after a little time, but not more than 60 minims should be inhaled within twenty-four hours. Trichlorethylene is irritant, hence it should not be allowed to come into contact with the nose when the vapour is inhaled. Externally, it has been used to destroy body lice, a 1 in 4 solution of trichlorethylene in soft paraffin being rubbed on the affected parts. Trichlorethylene is rather more toxic than chloroform. It is used as a solvent for rubber, bitumen, resins, fats and sulphur, and to reduce the inflammability of lacquers.

THALLII ACETAS
(Thall. Acet.)

Thallium Acetate

$C_2H_3O_2Tl = 263·4$

Synonym—Thallous Acetate.

Thallium acetate, $CH_3 \cdot COOTl$, may be prepared by neutralising an aqueous solution of thallous hydroxide with acetic acid. The salt may

be recrystallised from alcohol. It occurs as colourless needles or as a white, crystalline powder, melting at about 131°. When moistened with hydrochloric acid and introduced on a platinum wire into the bunsen flame, it gives a green colour to the flame. Hydrogen sulphide gives with thallous compounds in ammoniacal solution a black precipitate soluble in mineral acids, but insoluble in acetic acid. An aqueous solution of a thallous salt yields a light yellow precipitate with potassium iodide, a light yellow precipitate with platinic chloride, a scarlet precipitate with sodium cobaltinitrite, and a yellow precipitate with potassium chromate solution.

Soluble in water.

Standard.—Thallium acetate contains not less than 98 per cent. of $C_2H_3O_2Tl$. 1 gramme complies with the limit test for chlorides.

Assay.—Dissolve about 0·5 gramme, accurately weighed, in 20 millilitres of hot water, add 5 millilitres of sulphurous acid and warm on a water-bath; cool, add about 0·5 gramme of potassium iodide and allow to stand for twelve hours. Collect the precipitate of thallous iodide, wash with a 1 per cent. w/v potassium iodide solution and then with alcohol, dry at 100° and weigh; 1 gramme of thallous iodide is equivalent to 0·7950 gramme of $C_2H_3O_2Tl$.

Action and Uses.—Thallium acetate is used principally for its action as a depilatory in the treatment of ringworm of the scalp. It must be used with great caution, since if given in other than therapeutic doses it is apt to produce marked toxic symptoms. In therapeutic doses the epilation is confined to the scalp; large doses cause epilation of all parts of the body and produce toxic symptoms such as diarrhœa and vomiting, stomatitis, albuminuria, delirium and collapse. The margin between the dose required for epilation and the toxic dose appears to be extremely small and it is too powerful a drug to be used in routine treatment.

The average dose is 0·008 gramme per kilogram ($\frac{2}{35}$ grain per pound) of body weight, except when there is a marked discrepancy between age and body weight. This dose must not be repeated within a period of three months owing to the cumulative action of the drug and consequent danger of poisoning. Epilation takes place in about a fortnight, and the hair starts to grow again in about the same time. Permanent baldness does not occur. Young children tolerate thallium acetate much better than those past the age of puberty, and it is generally agreed that this treatment should be confined to children under ten years of age. Some authorities recommend its use only for children of four years and under, or where X-rays have proved unsuccessful. Strict attention to dosage is essential and the drug is contra-indicated when there is albuminuria or any general constitutional disease. After puberty severe toxic symptoms are likely to be produced and may cause permanent injury to health. Thallium acetate is best **administered** in sweetened aqueous solution.

In the treatment of **poisoning** by thallium salts the stomach should

be emptied by lavage or by emetics, and a cathartic administered to eliminate unabsorbed material from the gastro-intestinal tract. In acute cases 25 grammes of dextrose should be given intravenously, heat applied to the extremities and caffeine or adrenaline given to overcome shock. Intravenous injection of sodium iodide to convert the toxic soluble thallium salts into the almost insoluble iodides has been suggested; from 0·3 to 1 gramme (5 to 15 grains) may be given daily, increased to 1·6 to 2·6 grammes (25 to 40 grains) or more. Subsequently intravenous injection of sodium thiosulphate in doses of 0·3 to 1 gramme daily for an adult, and proportionate doses for children, may be given to promote the gradual elimination of the thallium in the urine. If too large doses of sodium thiosulphate are given, the thallium may be eliminated too rapidly with a return of toxic symptoms.

THEA
(Thea)
Tea

Tea is prepared from the young leaves and leaf-buds of *Camellia sinensis* (Linn.) O. Ktze. (Fam. Theaceæ), a shrub cultivated in China, Japan, Assam, Ceylon and other tropical countries. The leaf buds, together with two or three of the youngest leaves, are collected, allowed to wilt, and then rolled by hand or machinery until they acquire the characteristic twist. They are then subjected to a process of fermentation, the leaves being allowed to reach a temperature of 35° to 40°, until the colour changes to a yellowish-brown; they are then rolled again, rapidly dried, and graded by sifting. In the production of green tea, the slightly wilted leaves are at once heated in a pan over an open fire; they are then collected and fermented, during which the green colour is more or less retained. The difference in colour is probably due to the destruction by heat of an oxidase (thease) which, in the case of black tea, acts upon the tannin, converting part of it into insoluble oxidation products, hence green tea contains more tannin than black. During the fermentation process, which is common to both black and green tea, changes are induced, resulting in the production of the characteristic aroma and the destruction of a bitter principle. The nature of these changes is rather obscure but they are probably due to enzyme action.

The leaf is usually broadly lanceolate, firm in texture, rather thick, and tapers to a short petiole. The upper surface is glossy, and the under surface, when the leaf is young, is pubescent, and in older leaves nearly glabrous. The serrated margin is slightly inrolled and bears characteristic, shrunken, glandular teeth which readily break off. Old leaves may attain 15 centimetres in length, but those used for the production of tea seldom exceed 5 centimetres.

The diagnostic **microscopical** characters are the occasional thick-walled, tapering, unicellular hairs, often attaining 500 to 700 microns in

length; the lignified, sclerenchymatous, branched idioblasts, especially in the petiole and midrib; the stomata on the under surface only, each stoma being surrounded by three or four tangentially elongated cells; the cluster-crystals of calcium oxalate in the spongy parenchyma. When the powder is heated, a characteristic micro-sublimate of caffeine is obtained.

Tea **contains** 1 to 4 per cent. of caffeine, 7 to 15 per cent. of tannin and a trace of volatile oil; traces of xanthine, hypoxanthine, adenine and theophylline have also been detected. The percentage of caffeine is usually between 3 and 4 per cent.; the commercial value of tea is, however, not determined by this factor alone, but by consideration of the size of the leaf and the taste of the infusion. The total ash varies from about 5 to 6·5 per cent.; the acid-insoluble ash is usually less than 0·5 per cent.

Standard.—Tea yields not less than 3 per cent. of water-soluble ash; alkalinity of the ash, calculated as K_2O, not less than 1·3 per cent.

Tea, in powder (Pulvis Theæ : Pulv. Theæ), contains the constituents and possesses the diagnostic microscopical characters of Thea, and complies with the limits for water-soluble ash and alkalinity of the ash of the unground drug.

Uses.—Tea is used principally as a beverage. It is used in mixtures prepared for smoking or burning in asthma. A strong decoction of tea is used as an antidote in cases of poisoning by alkaloids and heavy metals and as an extemporaneous means of preparing tannic acid solution for use in the treatment of burns.

CATHA.—Catha, or Kat, Kath, Arabian or Abyssinian tea, consists of the dried leaves of *Catha edulis* Forsk (Fam. Celastraceæ), a small tree growing in Abyssinia and South-Western Arabia. The leaves are about 9 centimetres long and 4 centimetres wide; they are lanceolate or ovate-lanceolate, shortly petiolate, coriaceous and brownish-green; the upper surface is glossy, and the margin serrate. The odour is aromatic, and the taste, aromatic, sweet and astringent. Catha contains the alkaloids, *d*-nor-*iso*ephedrine (cathine), cathidine and cathinine. Other constituents are sugar, tannin and volatile oil. The action of catha may be taken as essentially comparable with that of other vegetable products which are used as "stimulant narcotics." It dilates the pupils and excites the whole of the central nervous system, but precise knowledge as to its mode of action is lacking.

MATÉ.—Maté, Paraguay tea or Maté Folia, consists of the dried leaves of *Ilex paraguensis* Hook. and other species of *Ilex* (Fam. Aquifoliaceæ), shrubs indigenous to Brazil and Argentina. After collection and drying, the drug is reduced to a coarse powder, which is packed in hide serons or in sacks for transportation. The leaves are shortly petiolate, ovate or oblong-lanceolate, 5 to 15 centimetres long, and the margin is distantly crenate-serrate; the surface is nearly glabrous, pale or dark green in colour, and the texture is coriaceous. The odour is aromatic, and the taste bitterish, astringent and somewhat empyreumatic. The diagnostic microscopical characters are the small, isodiametric, straight-walled cells of the upper epidermis, with a thick, striated cuticle; the lower epidermis with numerous stomata, each of which is surrounded and overhung by four or five cells; the abundant prismatic and cluster-crystals of calcium oxalate, occurring particularly in the cortex of the midrib, which is accompanied by a sheath of lignified, pericyclic fibres. Maté contains from 0·2 to 2 per cent. of caffeine, and about 7 per cent. of tannin. It is used in the form of infusion as a refreshing drink.

THEOBROMATIS SEMEN

(Theobrom. Sem.)

Theobroma Seed

Synonyms—Cacao Seed; Cocoa Seed.

Theobroma seed consists of the fermented and dried seeds of *Theobroma Cacao* Linn. (Fam. Sterculiaceæ), a native of tropical America and cultivated in most tropical countries. The bulk of the seed is exported from the West Coast of Africa, Ecuador and Brazil.

The seeds are flattened, ovoid, about 22 millimetres long, about 12 millimetres wide and about 6 millimetres thick. The testa is thin, brittle and brownish-red, and is marked with longitudinal veins radiating from the chalaza. The kernel consists of two irregularly folded, brown cotyledons which readily break into small, angular fragments (cocoa nibs), and into the folds of which the narrow endosperm penetrates. They have an agreeable odour when bruised or heated. The taste is at first astringent and bitter and then bland and oily.

The diagnostic **microscopical** characters are the elongated, polygonal cells of the seed coat epidermis, to which is nearly always attached the inner epidermis of the pericarp, the cells of which are narrow and elongated, crossing those of the epidermis at right angles; the large mucilage cells of the hypodermis; the sclerenchymatous layer of the seed coat; the polygonal cells of the cotyledons containing small starch grains; the epidermis of the cotyledons containing granules of brown pigment and bearing somewhat club-shaped, multicellular hairs.

The kernel **contains** about 0·9 to 3 per cent. of theobromine, together with a small amount of caffeine, 40 to 60 per cent. of solid fat, and about 2·5 per cent. of sugars, mainly sucrose and dextrose. The shell contains about 0·4 to 2 per cent. of theobromine and also mucilage.

Uses.—Theobroma seed is used as the source of oil of theobroma and for the preparation of cocoa powder and chocolate.

THEOBROMA PRÆPARATA.—Cocoa powder, or cocoa essence, is roasted theobroma seed, deprived of its shell, pressed to remove a portion of the fat, and finely ground. Before expression of the fat, the seeds are frequently subjected to a process of "alkalisation" with magnesium carbonate or a solution of sodium, potassium or ammonium carbonate. The powder is often flavoured by the addition of small amounts of vanillin or powdered cinnamon bark. Cocoa powder is a fine powder, varying in colour from light brown to dark reddish-brown, and having a flavour and odour similar to those of theobroma seed but more aromatic; it exhibits the microscopical characters described under theobroma seed. Cocoa powder contains from 20 to 30 per cent. of fat (cocoa butter), 0·05 to 2 per cent. of theobromine, and from 3 to 6 per cent. of moisture. The total ash varies from 4·5 to 7·5 per cent., and the acid-insoluble ash from 0·02 to 0·2 per cent. Cocoa powder is used in the preparation of certain tablets and lozenges, and in the preparation of compound powder of barium sulphate. It is also used as a nutritious beverage taken in hot milk or water.

THEOBROMA SACCHARATA.—Chocolate is roasted theobroma seed, deprived of its shell, finely ground and mixed with powdered sugar and a proportion of cocoa fat, with the addition of a small amount of vanillin or other flavouring

material. After incorporation of the ingredients, the mixture is subjected to hot milling and then poured into metal moulds. Chocolate usually occurs in the form of slabs or bars, which are brittle and break with a smooth, uniform fracture, or in powder; it is of a dark reddish-brown colour, and has a flavour and odour similar to those of theobroma seed but sweeter and more aromatic. Chocolate contains from about 28 to 38 per cent. of fat (cocoa butter), and from about 40 to 60 per cent. of sugar. The ash varies from about 2·5 to 4 per cent. Chocolate powder is used in the preparation of tablets and lozenges. Its agreeable flavour and preservative action also render it useful as a basis for preparing glyceryl trinitrate, erythrityl tetranitrate and santonin tablets, and for coating pills.

THEOBROMINA

(Theobrom.)

Theobromine

$C_7H_8O_2N_4 = 180{\cdot}1$

Theobromine, or 3 : 7-dimethylxanthine, is an alkaloid contained in the seeds of *Theobroma Cacao* Linn. It is said not to be present as theobromine in the unfermented seeds, but to develop during the process of curing by the splitting up of a glycoside, dextrose and cacaored being the other products. It may be prepared from cocoa husk by extracting with water and lime, neutralising and evaporating the extract, and subsequently purifying the crude theobromine by decolourising with charcoal and recrystallising from boiling water.

Theobromine occurs in the form of an odourless, white, crystalline powder or in rhombic needles, having a neutral reaction and a taste at first, slightly bitter, but gradually becoming more bitter. It sublimes at 290° without decomposition, and behaves both as an acid and as a weak base. When bromine water is added to a solution of theobromine in hydrochloric acid and excess of bromine is driven off, the solution turns blue on the addition of a trace of ferrous sulphate solution and a few drops of ammonia. On evaporating a mixture of theobromine and chlorine water to dryness and then adding ammonia, a purple colour is developed. The alkali hydroxides form salts and the alkaloid is not extracted from alkaline solution by shaking with immiscible solvents. Theobromine is readily and completely converted into caffeine by mixing a solution in a slight excess of sodium or potassium hydroxide with dimethyl sulphate. Neutral solutions are not precipitated by solutions of iodine in potassium iodide, but on the addition of acid a copious precipitate is produced. Neither neutral nor acid solutions are precipitated by potassio-mercuric iodide solution.

Soluble in water (1 in 1000), boiling water (1 in 115), alcohol (1 in 1400) and boiling alcohol (1 in about 260).

Standard.—Theobromine loses, on drying at 100°, not more than 3 per cent. of its weight. Ash, not more than 0·1 per cent. Potassio-mercuric iodide solution produces no cloudiness or precipitate in a 1 in 2000 aqueous solution (limit of other alkaloids). Dissolve 1 gramme in 10 millilitres of water and 5 millilitres of sodium hydroxide

solution and extract with two successive portions of 10 millilitres each of chloroform; filter the chloroform extracts through a dry filter, evaporate and dry at 100°; the residue weighs not more than 0·010 gramme (limit of caffeine). 0·4 gramme dissolves in 10 millilitres of sulphuric acid, the solution being coloured not more than faintly yellow (limit of readily carbonisable substances).

Action and Uses.—Theobromine resembles caffeine in its action, with the difference that, while its effect upon the central nervous system is very much less than that of caffeine, its action on muscle, and on the kidneys and heart is more pronounced. It is used principally for its diuretic effect, rendering the kidney structures more permeable to water. This action is exerted with more certainty and to a greater extent than with caffeine, and the nervous symptoms and cerebral excitement produced by the latter are absent. It is especially useful when there is an accumulation of fluid in the body resulting from cardiac failure, in which case it is often prescribed with digitalis. Although theobromine produces a general rise in blood pressure, the rise is less than that produced by caffeine and its employment in high blood pressure is not contra-indicated. It is sometimes used in angina pectoris and is employed in dropsy of renal or hepatic origin. It is contra-indicated in acute nephritis. In large doses it may cause nausea and loss of appetite.

Theobromine is best **administered** in powders or cachets. A combination of theobromine and phenobarbitone in tablet form, Tabellæ Phenobarbitoni et Theobrominæ, is sometimes employed to allay the nervous excitement and insomnia associated with arterio-sclerosis and angina pectoris.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

THEOBROMINA ET SODII ACETAS.—Theobromine and sodium acetate is a mixture of sodium acetate with the sodium derivative of theobromine, and contains about 63 per cent. of theobromine. It occurs as a white, odourless, hygroscopic powder, soluble in water (1 in 2) and in alcohol (90 per cent.) (1 in 200). It is decomposed by acids and is incompatible with sodium bicarbonate, alkaloids and ammonium salts. Theobromine and sodium acetate is used for the same purposes as theobromine. Dose.– 0·6 to 1 gramme (10 to 15 grains).

Preparation

Tabellæ Phenobarbitoni et Theobrominæ, B.P.C.—(Tab. Phenobarbiton. et Theobrom.)—Tablets of Phenobarbitone and Theobromine. Each tablet contains ½ grain of phenobarbitone and 5 grains of theobromine. Dose.– 1 or 2 tablets.

THEOBROMINA ET SODII SALICYLAS

(Theobrom. et Sod. Salicyl.)

Theobromine and Sodium Salicylate

Theobromine and sodium salicylate is a mixture of sodium salicylate and the sodium derivative of theobromine in approximately molecular

proportions. It may be obtained by dissolving 90 parts of theobromine in 100 parts of water containing 20 parts of sodium hydroxide, adding the solution to a solution of 80 parts of sodium salicylate in 75 parts of water, evaporating the mixed solutions rapidly, and drying the product. It occurs as a white, odourless, amorphous powder, having a sweetish, alkaline taste. The aqueous solution is strongly alkaline to phenolphthalein; when acidified with acetic acid and ferric chloride solution is added, a violet colour is produced. When the aqueous solution is neutralised with hydrochloric acid, a white precipitate of theobromine is produced which, when washed and dried, responds to the identity tests described under Theobromina. On ignition, theobromine and sodium salicylate leaves a residue of sodium carbonate. It should be **stored** in well-closed, glass-stoppered bottles and protected from light.

Soluble in water (1 in 1); insoluble in alcohol (90 per cent.), ether and chloroform.

Standard, B.P.—Theobromine and sodium salicylate contains not less than 46 per cent. of $C_7H_8O_2N_4$ (theobromine), not less than 41 per cent. of $C_7H_5O_3Na$ (sodium salicylate), and not more than 6·9 per cent. of Na additional to that contained in the sodium salicylate, all calculated on the substance dried at 110°. Loss on drying at 110°, not more than 5 per cent. Arsenic limit, 2 parts per million. Lead limit, 10 parts per million. A 20 per cent. w/v aqueous solution is clear and colourless or faintly yellow. It complies also with a limit test for caffeine.

Action and Uses.—The properties of theobromine and sodium salicylate resemble those of theobromine. It is used as a diuretic in cardiac dropsy and chronic Bright's disease with œdema; administered with digitalis, its diuretic action is prolonged. It may be pointed out that the use of any diuretic involves greater work for the kidneys; even the increased excretion of water causes the kidneys to absorb more oxygen and excrete more carbonate. Hence it is doubtful how far it is desirable to increase the activity of diseased kidneys. Theobromine and sodium salicylate is best **administered** in solution, cachets or tablets. It is **incompatible** with acids, ammonium salts and sodium bicarbonate.

Dose.– 0·6 to 1·2 grammes (10 to 20 grains).

THEOPHYLLINA

(Theophyll.)

Theophylline

$C_7H_8O_2N_4,H_2O = 198·1$

Theophylline, or 1:3-dimethylxanthine, is an isomeride of theobromine with which it is found associated in small quantities in tea. It may be isolated from the mother liquors obtained in the separation of theobromine from this source, but is also manufactured by synthesis from

dimethylcarbamide and ethylcyanacetate. It occurs as a white, crystalline powder containing one molecule of water of crystallisation, which can be removed by heating at 100°. It is odourless and has a bitter taste. Theophylline is a weak base, forming salts with acids and soluble derivatives with the alkali metals. It forms insoluble compounds with silver and mercury. 0·01 gramme with 1 millilitre of hydrochloric acid and 0·1 gramme of potassium chlorate, evaporated to dryness in a porcelain dish, leaves a reddish residue which becomes purple when exposed to the vapour of dilute solution of ammonia.

Soluble in water (1 in 160) and alcohol (90 per cent.) (1 in 100); sparingly soluble in ether; readily soluble in solutions of alkali hydroxides.

Standard.—Theophylline melts between 265° and 270°. Loss on drying at 100°, not more than 9·5 per cent. Residue on ignition, not more than 0·1 per cent. A saturated aqueous solution is neutral to litmus. 0·2 gramme dissolves readily and completely in 5 millilitres of sodium hydroxide solution, and in 5 millilitres of dilute solution of ammonia.

Action and Uses.—Theophylline has a more marked diuretic action than theobromine, but is liable to cause digestive disturbance. It is generally **administered** in the form of theophylline and sodium acetate.

Dose.– 0·06 to 0·15 gramme (1 to 2½ grains).

THEOPHYLLINA ET SODII ACETAS

(Theophyll. et Sod. Acet.)

Theophylline and Sodium Acetate

Theophylline and sodium acetate may be obtained by mixing an aqueous solution of the sodium derivative of theophylline with an aqueous solution of an equimolecular proportion of sodium acetate, and evaporating the mixture to dryness. It occurs as a white, odourless, crystalline powder, with a bitter taste. The aqueous solution is alkaline to litmus; when neutralised with dilute acetic acid, it yields a white precipitate of theophylline which, when washed and rendered anhydrous by drying at 100°, has a melting-point of 265° to 272°. The separated theophylline responds to the test with hydrochloric acid, potassium chlorate and ammonia vapour described under Theophyllina; it may be distinguished from theobromine by its greater solubility in dilute solution of ammonia, forming a clear 4 per cent. w/v solution. When a suspension of theophylline and sodium acetate in alcohol (70 per cent.) is boiled with a few drops of sulphuric acid, the odour of ethyl acetate is evolved.

Soluble in water (1 in 25); insoluble in alcohol (90 per cent.), ether and chloroform.

Standard, B.P.—Theophylline and sodium acetate contains not less than 55 per cent. of anhydrous theophylline, $C_7H_8O_2N_4$. Arsenic limit, 2 parts per million. It complies also with a limit test for caffeine.

Action and Uses.—Theophylline and sodium acetate resembles theobromine in its action, but is a more powerful diuretic and, like theophylline, is more liable than theobromine to cause gastric disturbance. It may be **administered** in solution or in cachets. Theophylline and sodium acetate is **incompatible** with acids, ammonium salts and sodium bicarbonate.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

THIOSINAMINA

(Thiosinam.)

Thiosinamine

$C_4H_8N_2S = 116·1$

Synonyms—Allylthiocarbamide; Allylthiourea.

Thiosinamine, $CS(NH_2)NHC_3H_5$, may be prepared by mixing 2 parts of volatile oil of mustard with 1 part of dehydrated alcohol, adding 7 parts or excess of solution of ammonia, and heating the mixture at 40° for several hours. The odours of the oil and ammonia disappear and on evaporating the solution the thiosinamine crystallises. It may be decolourised with charcoal. It occurs in the form of white, glistening, prismatic crystals, sometimes odourless, but usually having a faint, garlic-like odour and a bitter taste. When heated, it evolves white alkaline vapours and leaves a carbonaceous residue. The aqueous solution forms a white precipitate with mercuric salts, a grey precipitate with mercurous salts, and a white precipitate with silver nitrate.

Soluble in water (1 in 17), alcohol (1 in 2) and ether.

Standard.—Thiosinamine melts between 72° and 74°. Ash, not more than 0·05 per cent.

Action and Uses.—Thiosinamine has been used as an injection for the removal of scar-tissue, exudates, lymphatic swellings, etc. It has been recommended for Dupuytren's contraction, the scars of burns, cirrhosis of the liver, fibrous ankylosis of joints and stenosis of the alimentary canal. The hypothesis that it causes absorbtion of fibrous tissue still requires proof. It has been employed in 10 per cent. solution in dilute glycerin, or as Injectio Thiosinaminæ et Sodii Salicylatis, to remove fibrous tissue in lupus scars, uterine indurations, urethral strictures, keloid, etc., the dose being 1 millilitre (15 minims). It should be injected in the neighbourhood of the tissue to be absorbed and the injections must be continued for several months. In the form of soap and plaster it has been used in hypertrophic conditions of the skin; it is also used in the form of dusting powder. Internally it has been given in capsules

containing 0·03 to 0·1 gramme (½ to 1½ grains), with doubtful success, in rheumatic enlargements of the joints; it may also be administered, with caution, in alcoholic solution. Its value is probably negligible and though it is usually well borne, toxic effects sometimes occur; these are nausea, vomiting, headache and fever. Solutions of thiosinamine for **injection,** prepared with the addition of sodium salicylate or phenazone, may be sterilised by tyndallisation or by filtration.

Dose.– 0·03 to 0·1 gramme (½ to 1½ grains).

THIOSINAMINÆ ET ÆTHYLIS IODIDUM.—Thiosinamine ethyl iodide is prepared by combining molecular proportions of thiosinamine and ethyl iodide with the aid of gentle heat. The liquid solidifies on cooling into a crystalline mass. Thiosinamine ethyl iodide is a white, crystalline powder, with a faint odour of mustard oil. It is readily soluble in water (1 in 10), and melts at about 70°. As a fibrolytic agent, thiosinamine ethyl iodide, on account of its iodine content, probably possesses advantages over thiosinamine. It is used in the treatment of difficult and intractable cases of rheumatoid arthritis and allied conditions, and is said to be well tolerated and less depressing than potassium iodide. It may be administered either hypodermically or orally; for the latter purpose it should be given in gelatin capsules. Rapid and complete success is reported from its use hypodermically in the treatment of actinomycosis. An ointment or paint containing 15 per cent. of thiosinamine ethyl iodide may be employed as a local application or for gentle massage. Skin eruptions may occur during the administration of the drug, when it is advisable to discontinue the treatment for a time. A saline draught should be given each morning during the administration of thiosinamine ethyl iodide, and dietetic measures such as the avoidance of wines, beer, stout and red meat should be adopted, and a copious intake of water encouraged. Dose.– 0 06 to 0·25 gramme (1 to 4 grains) daily, by the mouth; 0·2 to 0·4 gramme (3 to 6 grains) three times weekly, by injection.

Preparation

Injectio Thiosinaminæ et Sodii Salicylatis, B.P.C.—(Inj. Thiosinam. et Sod. Salicyl.)—Injection of Thiosinamine and Sodium Salicylate. Thiosinamine, 10 per cent. w/v, dissolved in an aqueous solution of sodium salicylate with 5 per cent. v/v of glycerin. Dose.– 0·5 to 1 millilitre (8 to 15 minims), by intramuscular or subcutaneous injection.

THYMI HERBA
(Thym. Herb.)

Thyme

Thyme consists of the dried flowering tops of *Thymus vulgaris* Linn. (Fam. Labiatæ), a small aromatic shrub indigenous to Southern-Central Europe and widely cultivated in England, France, Germany, Spain and the United States of America.

The slender, ascending, quadrangular branches are from 10 to 20 centimetres long, greyish-brown or purplish in colour, with sessile or shortly stalked, opposite, linear-lanceolate or ovate-oblong leaves up to 9 millimetres long and 2 millimetres wide, with revolute margins and hairy on both surfaces. The shortly-stalked flowers are arranged in axillary and terminal verticillasters. The calyx is 5-toothed and 2-lipped, with a ring of stiff hairs in the throat; the corolla is bilabiate with a 3-lobed underlip and an erect, emarginate upper lip; it is pale rose or white in colour. The odour and taste are agreeable and aromatic.

The diagnostic **microscopical** characters are the epidermis of the leaves, the majority of the cells of which are prolonged with conical trichomes, those on the upper surface being mostly unicellular and up to 60 microns long, and those on the lower surface usually 2 to 3 celled and often knee-shaped, and up to 300 microns long; the presence of labiate stomata and glands, the 6- to 8-celled, uniseriate trichomes from the throat of the calyx, up to 400 microns long; the spherical pollen grains, about 40 microns in diameter.

Thyme **contains** from about 0·4 to 1·5 per cent. of volatile oil.

Standard.—Thyme contains not more than 3 per cent. of foreign organic matter and stems over 1 millimetre in diameter. Acid-insoluble ash, not more than 4 per cent.

Thyme, in powder (Pulvis Thymi Herbæ : Pulv. Thym. Herb.), contains the constituents and possesses the diagnostic microscopical characters of Thymi Herba, and complies with the limit for acid-insoluble ash of the unground drug.

Action and Uses.—Thyme has stimulating and carminative properties. The liquid extract is used in the preparation of cough linctuses.

Preparations

Elixir Thymi, B.P.C.—(Elix. Thym.)—Elixir of Thyme. Each fluid drachm contains 7½ minims of liquid extract of thyme and 2 grains of ammonium bromide, with spirit of chloroform, glycerin, treacle and syrup. Dose.—4 to 8 millilitres (1 to 2 fluid drachms).

Extractum Thymi Liquidum, B.P.C.—(Ext. Thym. Liq.)—Liquid Extract of Thyme. *Syn.*—Extractum Thymi Vulgaris Liquidum. 1 in 1. Dose.—0·6 to 4 millilitres (10 to 60 minims).

Linctus Diamorphinæ et Thymi, B.P.C.—(Linct. Diamorph. et Thym.)—Linctus of Diamorphine and Thyme. Each fluid drachm contains $\frac{1}{100}$ grain of diamorphine hydrochloride and $\frac{1}{32}$ grain of apomorphine hydrochloride, with liquid extract of thyme, solution of tolu and glycerin. Dose.—2 to 4 millilitres (½ to 1 fluid drachm).

THYMOL
(Thymol)
Thymol

$C_{10}H_{14}O = 150·1$

Thymol is 3-methyl-6-*iso*propylphenol, $CH_3 \cdot C_6H_3(OH) \cdot C_3H_7$, and may be obtained synthetically, or extracted from oil of thyme or from the oils of *Monarda punctata* Linn. (Fam. Labiatæ) or *Trachyspermum Ammi* (Linn.) Sprague (Fam. Umbelliferæ). Oil of thyme yields about 20 to 30 per cent. of thymol; the other two oils yield respectively about 60 per cent. and about 45 to 55 per cent. It is extracted by distilling off the hydrocarbons and extracting the residue with sodium hydroxide which forms with thymol a soluble sodium derivative. The solution obtained is acidified and the thymol thus liberated is recrystallised from alcohol or light petroleum. Synthetic thymol may be produced from piperitone, menthone, or *p*-cymene.

Thymol occurs in large, colourless, transparent crystals, having a pungent, aromatic, thyme-like odour and a pungent, aromatic taste. It sinks in cold water, but on heating to about 45° it rises to the surface and melts. An alcoholic solution shows no colouration on the addition of ferric chloride solution. The aqueous solution becomes turbid on the addition of bromine water, but no precipitate is produced. When triturated with an equal weight of menthol, phenol, or camphor, liquefaction takes place. If a small crystal is dissolved in 1 millilitre of glacial acetic acid, and 0·3 millilitre of sulphuric acid and 1 drop of nitric acid added, a bluish-green colouration is produced. When 1 gramme is heated on a water-bath with 2·5 millilitres of sodium hydroxide solution diluted with an equal volume of water, a solution is formed which becomes darker on standing, and on adding a few drops of chloroform and shaking, a violet colouration is produced. A purple-red colour is produced when a trace of thymol is heated with chloroform and a trace of potassium hydroxide; this reaction is also given by carvacrol. Thymol in alkaline solution forms a red, insoluble tetraiodo-derivative on adding a solution of iodine.

Soluble in water (about 1 in 1000), alcohol (90 per cent.) (1 in 1), ether (1 in 1·5) and chloroform (1 in 0·6).

Standard, B.P.—Thymol has a melting-point of 48° to 51°. Residue when heated in an open dish on a water-bath, not more than 0·05 per cent. The alcoholic solution is optically inactive and neutral to litmus. The 20 per cent. w/v solution in 10 per cent. w/v sodium hydroxide solution is clear and colourless or pale red; on standing, oily drops do not separate.

Action and Uses.—Thymol resembles phenol in its action, but owing to its insolubility in the fluids of the body it is absorbed much more slowly; it is also less irritant to wounds. Its germicidal action is greater than that of phenol, but less than that of betanaphthol. Its toxicity is about one-fourth that of phenol even after absorption. Thymol is sometimes used as an intestinal antiseptic in doses of 0·12 gramme (2 grains). It may colour the urine green. In oily solution (1 or 2 per cent.) it is applied to the respiratory passages by means of a spray in the treatment of nasal catarrh. The vapour from an alcoholic solution may be inhaled from hot water or from a dry inhaler, in laryngitis and bronchial affections.

Thymol is given internally in large doses, 2 grammes (30 grains) or more, repeated after two hours, to strong, healthy adults to expel intestinal parasites, especially *Ankylostomum duodenale*. It is taken fasting and followed after two hours by a saline purge, and the treatment is continued at weekly intervals until successful. As with other anthelmintics, liberal doses of sodium bicarbonate should be given for three days before the thymol. Between the times of taking the drug and the purge no alcohol or food should be taken, otherwise absorption may take place with production of toxic symptoms. To children and delicate persons not more than 0·6 gramme (10 grains) of thymol should be given. Frequently patients suffer from disagreeable after-effects,

characterised by nausea, vomiting and renal irritation, and carbon tetrachloride or oil of chenopodium is usually more satisfactory. In alcoholic solution, thymol penetrates the skin and produces local anæsthesia.

It is used as an antiseptic lotion and mouth-wash (1 in 2000, or as Liquor Thymolis Compositus or Glycerinum Thymolis Compositum), as a paint in ringworm (1 in 10 of alcohol, or alcohol and ether), and as an ointment (1 in 24 of soft paraffin, the thymol being dissolved with the aid of heat) for eczema, psoriasis, broken chilblains and parasitic skin affections. An ointment (1 in 12), perfumed with oil of lavender, is used to repel gnats and mosquitoes. For its action as a vermifuge it should be **administered** in a cachet or capsule, alcohol or other solvent being avoided. It is also used as an anthelmintic in veterinary practice.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains); as an anthelmintic, 1 to 2 grammes (15 to 30 grains).

Preparations

Glycerinum Thymolis Compositum, B.P.C.—(Glycer. Thymol. Co.)—Compound Glycerin of Thymol. *Syn.*—Glycerinum Thymol Alkalinum. An alkaline solution of thymol with other aromatic antiseptics.

Liquor Thymolis Compositus, B.P.C.—(Liq. Thymol. Co.)—Compound Solution of Thymol. *Syn.*—Liquor Antisepticus; Antiseptic Solution. It contains boric and benzoic acids, thymol, eucalyptol, oils of peppermint, sweet birch and thyme, with tincture of baptisia, alcohol (90 per cent.) and distilled water. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Nebula Cocainæ Composita, B.P.C.—(Neb. Cocain. Co.)—Compound Cocaine Spray. Cocaine, 0·5 per cent. w/v, in compound menthol and thymol spray.

Nebula Mentholis et Thymolis Composita, B.P.C.—(Neb. Menthol. et Thymol. Co.)—Compound Menthol and Thymol Spray. Menthol, camphor and phenol, of each 2 per cent. w/v, and thymol, 0·2 per cent. w/v, in light liquid paraffin.

THYMOLIS IODIDUM

(Thymol. Iod.)

Thymol Iodide

$C_{20}H_{24}O_2I = 550·0$

Synonym—Dithymol-diiodide.

Thymol iodide, $[C_6H_2(CH_3)(C_3H_7)OI]_2$, may be prepared by the interaction of thymol and iodine. It occurs as a reddish-brown or brick-red, bulky, amorphous powder, having a very slight, aromatic odour; it is almost tasteless. Solutions should be made without the aid of heat and kept in amber-coloured glass bottles, protected from the action of light. On heating, it is decomposed with evolution of iodine vapours. Heated with concentrated sulphuric acid, it is decomposed with separation of iodine. Commercial samples of thymol iodide vary in composition, owing to differences in methods of preparation.

Insoluble in water, alcohol, glycerin, solution of sodium hydroxide,

hot or cold; soluble in ether (1 in 10) leaving a slight residue, chloroform (1 in 50), carbon disulphide, collodion, soft paraffin and fixed and volatile oils.

Standard.—Thymol iodide, determined by the method of the British Pharmacopœia for Iodophthaleinum, contains not less than 40 per cent. of I, calculated on the substance dried over sulphuric acid. Loss on drying over sulphuric acid, not more than 5 per cent. Sulphated ash, not more than 3·0 per cent. Digest 0·1 gramme with 50 millilitres of warm water for ten minutes, filter and cool; the solution complies with the limit test for chlorides (limit of soluble halides). 10 millilitres of water shaken with 0·5 gramme and filtered, forms a solution which is not alkaline to litmus and is not affected by starch mucilage (limit of free iodine).

Action and Uses.—Thymol iodide possesses weak local antiseptic properties and is used as an iodoform substitute. It has the advantage of being practically odourless, but it does not liberate iodine in the tissues and cannot, therefore, replace iodoform in surgery; moreover, on account of its extreme insolubility, even in the alkaline fluids of the body, the thymol is less active in this combination than in the free state. It passes through the body unchanged and unabsorbed. It is used as a dusting powder for burns and wounds, either in the pure state or mixed with 1 to 3 parts of purified talc. It is also used as an insufflation. As an ointment (2 to 10 per cent.), prepared with soft paraffin or hydrous wool fat, it is applied to the skin in eczema, psoriasis, etc.; a 3 per cent. ointment, made with soft paraffin, is applied to the nasal mucous membrane in ozœna.

THYMUS
(Thym.)

Thymus

Synonym—Thymus Siccus.

Thymus consists of the thymus glands of the healthy calf, freed from fat, dried and powdered. It occurs as a yellowish, amorphous powder, with a slight meat-like odour. The powder represents approximately five times its weight of fresh thymus. It is partly soluble in water. The thymus gland occurs as a long, narrow, reddish or greyish lobulated body, situated in front of the chest behind the sternum and partly in the lower portion of the neck, surrounded by a fibrous capsule in which the processes divide the glands into lobes and lobules, the latter being further sub-divided into follicles by fine connective tissues. The thymus is composed of lymphoid tissue. No active principle has been isolated from the thymus gland, and no evidence of the existence of such a principle has yet been adduced.

Action and Uses.—The thymus gland in man reaches its maximum size during the first two or three years of life and then becomes smaller,

usually disappearing with the onset of puberty. The thymus appears to promote growth, to favour calcium retention and to exercise a restraining influence on the reproductive organs. It undergoes atrophy when its function has been accomplished. The gland persists in the condition known as status-thymico-lymphaticus. "Rejuvenation" of the thymus is seen in exophthalmic goitre, acromegaly, Addison's disease and some other endocrine disorders. These cases of general endocrine hypoplasia are chiefly seen in adult life, the females being infantile and the males devoid of secondary sex characteristics. So far as is known there are no clinical indications for the administration of the gland, but it has been recommended in disorders of nutrition in children. It is **administered** in tablets.

Dose.– 0·12 to 0·25 gramme (2 to 4 grains).

THYROIDEUM
(Thyroid.)

Thyroid

Synonyms—Thyroideum Siccum; Dry Thyroid; Thyroid Extract; Thyroid Gland.

Thyroid is obtained from the thyroid gland of the ox, sheep, or pig. The connective tissue and external fat are removed from the glands which are then dried at a temperature not exceeding 60°, powdered, and defatted by extraction with light petroleum. The residue is dried, assayed, and diluted to the required strength with lactose. The organic iodine compounds present in thyroid occur in protein combination as thyroglobulins which are soluble in water. On desiccation of the thyroid gland at a temperature of 40° or below, as much as 70 per cent. of the thyroglobulins remains unaltered and is, therefore, extractable by water. If the desiccation has been done at 100° or by treatment with alcohol, followed by drying at 60°, the thyroglobulins are almost completely denatured and rendered insoluble. These facts have an important bearing on the assay of the official substance.

Thyroid occurs as a cream-coloured, amorphous powder, having a faint, meat-like odour and taste. When a small quantity is boiled for four hours with N/1 sodium hydroxide and the product adjusted to *p*H 5 by the addition of a 50 per cent. v/v solution of sulphuric acid, a precipitate forms which responds to the test with hydrochloric acid, sodium nitrite and ammonia described under Thyroxinsodium. It should be **stored** in well-closed containers in a cool place.

Partly **soluble** in water, the solution containing the inorganic iodine and the thyroglobulins not denatured during the desiccation of the glands.

Standard, B.P.—Thyroid contains not less than 0·09 per cent. and not more than 0·11 per cent. of iodine in combination as thyroxine, and not more inorganic iodine than 10 per cent. of the content of total iodine.

Action and Uses.—Thyroid exerts a powerful effect on metabolism; following its administration by mouth, the metabolic processes proceed more rapidly and a reduction in body weight occurs. There is an increase in the consumption of oxygen and increased destruction of fats and protein. The administration of thyroid thus increases the available energy, increases the appetite and brightens the mental outlook. Following large doses there is also an increased excretion of water by the kidneys. The chief use of thyroid is in the treatment of cretinism and myxœdema and the dose for the latter purpose should usually not exceed 0·12 gramme (2 grains). Children who are cretins owe their lack of mental and physical development to the non-functioning of the thyroid gland; myxœdematous patients similarly owe their dull mentality and their thickened subcutaneous tissues to a failure of the thyroid to maintain its normal function. Thyroid is also often beneficial in young children who are making little physical and mental progress and in women up to the age of twenty-five. It is also used to relieve œdema, but not œdema due to heart failure.

Thyroid and preparations containing it have been used for the treatment of obesity, but its use for this purpose requires care since a rapid loss of fat from the heart walls is dangerous; in some cases, notably those which show a resemblance to myxœdema, and in obesity developing at the menopause, it is apparently satisfactory. Excessive doses of thyroid may increase the pulse rate, lower arterial pressure and give rise to restlessness, insomnia and palpitation of the heart. As the aim of thyroid administration is to bring the rate of metabolism up to normal, the dose and frequency of administration can best be suited to individual needs by determination of the basal metabolic rate.

Some difficulty has arisen in the past over the interpretation of doses of thyroid, owing to uncertainty whether the prescriber intended grains of fresh gland or grains of desiccated gland. Doses of the British Pharmacopœia refer to the desiccated and standardised powder. The unstandardised gland, whether fresh or dry, may vary more than sixfold in its content of active material.

Dose.– 0·03 to 0·3 gramme (½ to 5 grains).

Preparation

Extractum Thyroidei Liquidum, B.P.C.—(Ext. Thyroid. Liq.)—Liquid Extract of Thyroid. 1 in 4½. Dose.– 0·06 to 1·2 millilitres (1 to 20 minims).

THYROXINSODIUM

(Thyroxinsod.)

Thyroxine-sodium

$C_{15}H_{10}O_4NI_4Na = 798·8$

Thyroxine-sodium is the monosodium salt of *dl*-β-[3 : 5-diiodo-4-(3′ : 5′-diiodo-4′-hydroxyphenoxy) phenyl]-α-aminopropionic acid. It

may be obtained by the action of sodium carbonate on thyroxine which is obtained by the controlled hydrolysis of thyroid gland with barium hydroxide, and subsequent purification. Thyroxine can also be prepared synthetically. Thyroxine-sodium occurs as a white, crystalline powder. It is unstable in alkaline solutions. When a trace is dissolved in alcohol (50 per cent.) with the aid of one drop of hydrochloric acid, and one drop of a 20 per cent. w/v aqueous sodium nitrite solution is added, a yellow colour is produced which deepens on boiling; on cooling and adding excess of strong solution of ammonia, the colour changes to red. It should be **stored** in well-closed containers.

Slightly **soluble** in water; more soluble in solutions of sodium carbonate or sodium hydroxide.

Standard, B.P.—Thyroxine-sodium contains not less than 61 per cent. and not more than 65 per cent. of I.

Action and Uses.—Thyroxine-sodium is used for the same purposes as thyroid; it is the usual form for the administration of thyroxine, and when thyroxine is ordered, thyroxine-sodium may be dispensed. The action of thyroxine-sodium is qualitatively similar to that of thyroid, but the activity of the latter is quantitatively greater than that of the thyroxine-sodium equivalent to its thyroxine content. When given by mouth or by intravenous injection it does not usually cause an immediate effect, but in from twenty-four to thirty-six hours there is an increase in pulse rate. It is said that the maximum effect from a single injection is not reached until the tenth day and that the duration of the effect of a single administration of thyroxine-sodium is about three weeks. Repeated administration of small doses produces a greater effect than a single large dose. Thyroxine-sodium is indicated in cases of deficient or absent thyroid functioning, such as simple goitre, cretinism and myxœdema. Its use is contra-indicated in cases of exophthalmic goitre.

It is usually **administered** by intravenous injection, but may be given by mouth, although its absorption from the gastro-intestinal tract is uncertain. It is desirable that the optimum dose should be ascertained by trial for each case. The exact determination of the dose may be made by determining the basal metabolic rate. One milligram of thyroxine-sodium increases the basal metabolic rate in normal adults by approximately 2·5 per cent. In a normal adult, 0·002 gramme ($\frac{1}{30}$ grain) per day will produce evidence of hyperthyroidism, that is, loss of weight, increased pulse rate, nervous manifestations and a sense of fatigue. Cases of myxœdema require from 0·0015 to 0·002 gramme ($\frac{1}{40}$ to $\frac{1}{30}$ grain) of thyroxine-sodium per day. A cretin usually requires from 0·0002 to 0·0004 gramme ($\frac{1}{320}$ to $\frac{1}{160}$ grain) daily or on alternate days. Thyroxine-sodium in doses of 0 002 gramme ($\frac{1}{30}$ grain) is used in the treatment of pre-eclamptic toxæmia when retention of fluid is the main symptom. It has also been reported successful in the treatment of acute mercurial poisoning in doses of 0·0015 gramme ($\frac{1}{40}$ grain) daily for three days. Solutions of thyroxine-sodium for **injection** may be prepared

by aseptic methods and should be used within twenty-four hours of their preparation.

Dose.– 0·0001 to 0·001 gramme ($\frac{1}{640}$ to $\frac{1}{64}$ grain).

TILIA
(Tilia)
Tilia

Synonyms—Tilleul; Lime Flowers; Linden Flowers; Lime Tree Flowers.

Tilia consists of the dried inflorescences, with their attached bracts, of *Tilia europæa* Linn., *T. cordata* Mill. and *T. platyphyllos* Scop. (Fam. Tiliaceæ), collected when the flowers are fully expanded. It should be **stored** in well-closed containers and protected from the light and should not be used after being stored for more than 12 months from the date of collection.

The inflorescence is a dichasial cyme of from 1 to 15, usually 3 to 7, flowers which are brownish in colour and are borne upon a peduncle 6 to 9 centimetres long which is adnate to the bract for about one-third of its length from the base. The pedicels are up to about 2 centimetres long and the flowers are about 5 to 10 millimetres broad. Each flower has 5 hairy sepals, 5 petals, numerous stamens, often united in 5 groups, and 5 carpels united to form a superior ovary with 5 loculi each containing 2 ovules. The pale yellowish-green bract is linear-lanceolate, up to about 10 centimetres long and 2 centimetres wide, with an entire margin, a conspicuous pinnate venation and an obtuse apex. The odour is faintly aromatic and the taste mucilaginous. Tilia **contains** volatile oil, mucilage, sugar and tannin.

Action and Uses.—Tilia is rarely used in medicine. It is reputed to have antispasmodic and diaphoretic properties and, as a domestic remedy, is **administered** in the form of fresh infusion.

TOLUENUM
(Toluen.)
Toluene

$C_7H_8 = 92·06$

Synonyms—Toluol; Methylbenzene.

Toluene, $C_6H_5·CH_3$, is obtained by fractionation of the refined light oil of coal tar. It was originally obtained by the dry distillation of balsam of tolu, hence its name. It occurs as a colourless, light, mobile, highly

refractive liquid with a characteristic odour, and burns with a luminous and very sooty flame. Specific gravity, about 0·87. Boiling-point, about 111°. Flash-point, about 7°. It is oxidised by heating with chromic acid, dilute nitric acid, or alkaline potassium permanganate solution with the formation of benzoic acid. Substitution is mainly directed into the *o*- and *p*- positions. The *o*- and *p*-sulphonic acids of toluene are intermediate products in the manufacture of saccharin and chloramine, whilst 2 : 4 : 6-trinitrotoluene is an important explosive. Toluene is also the starting point in the synthesis of many other compounds, such as benzaldehyde, benzoic acid, etc. It is readily distinguished from benzene by remaining liquid at −20°. Toluene dissolves sulphur, phosphorus, iodine, etc. When used for the sterilisation of catgut it should be free from thiophene.

Soluble in alcohol, ether, chloroform, carbon disulphide, acetone and glacial acetic acid; insoluble in water.

Uses.—Toluene is used as a preservative of urine before chemical examination and for the sterilisation of catgut.

SOLVENT-NAPHTHA, consisting principally of xylenes and trimethylbenzenes, and boiling between 140° and 180°, is used for chemical washing, extraction of perfumes and in the linoleum, rubber and varnish industries. It should be distinguished from solvent mineral naphtha, which is a petroleum product.

XYLENUM.—Xylene, or xylol, is dimethylbenzene, $C_6H_4(CH_3)_2$. It occurs naturally in some petroleum oils, and is obtained by the fractionation of the refined light oil of coal tar. It is a mixture of *o*-, *m*-, and *p*-xylenes, and occurs as a thin, white, mobile liquid resembling benzene and toluene and having a peculiar odour. It solidifies at about −28° and boils at about 140°. The specific gravity is about 0·865. It is insoluble in water; soluble in alcohol, ether, chloroform, etc. Xylene is used to sterilise catgut ligatures and as a clearing agent in microscopy.

Preparation

Pigmentum Mentholis et Tolueni, B.P.C.—(Pig. Menthol. et Toluen.)—Menthol and Toluene Paint. *Syn.*—Löffler's Paint. Menthol, 10 per cent. w/v, with dehydrated alcohol, strong solution of ferric chloride and toluene.

TONCO SEMEN

(Tonco Sem.)

Tonka Seed

Synonyms—Tonka Beans; Tonquin Beans.

Tonka seed is derived from the seeds of two species of *Dipteryx* (Fam. Leguminosæ), namely *D. odorata* Willd., a native of Guiana, and *D. oppositifolia* Willd., a large tree indigenous to Brazil. The seeds are dried in the sun or exported to Trinidad and there "cured" or "frosted" by steeping in rum for a few days and spreading them out to dry.

The seeds are exalbuminous and are usually 3 to 4 centimetres long, 10 millimetres wide and 8 millimetres thick, flattened, ovoid, rounded at one extremity and somewhat pointed at the other. The brittle testa is coarsely wrinkled internally and is nearly black in colour and, in the case of frosted seeds, covered with minute crystals of coumarin; one edge of the seed is acute and the other rounded. The embryo consists of two large, brown cotyledons enclosing a plumule and a short, thick radicle. The seeds have a marked fragrant odour and a somewhat bitter taste. Tonka seed **contains** coumarin, which may be present to the extent of about 3 per cent. Fixed oil, about 45 per cent., and proteins are also present.

Action and Uses.—Tonka seed was formerly used as the source of coumarin, but the greater part of this substance employed is now produced synthetically. It is used in perfumery.

TOTAQUINA

(Totaquin.)

Totaquine

Totaquine is a mixture of alkaloids obtained from the bark of various species of *Cinchona* such as *C. succirubra* Pavon and *C. robusta* Howard. Its introduction was suggested by the Malaria Commission of the League of Nations in 1931 as a substitute for quinine. It occurs as a nearly colourless or pale yellowish-grey or brown powder, without odour but having a bitter taste. The alcoholic solution is alkaline to litmus. When heated in a dry tube it chars and evolves an alkaline vapour. A dilute aqueous solution, prepared with the aid of a small quantity of dilute sulphuric acid, shows a blue fluorescence. It responds to the test with bromine water and dilute solution of ammonia described under Quinina.

Almost **insoluble** in water; almost completely soluble in warm alcohol (95 per cent.) and chloroform; partly soluble in ether, benzene and light petroleum.

Standard, B.P.—Totaquine contains not less than 70 per cent. of crystallisable cinchona alkaloids, of which not less than one-fifth is quinine. Loss on drying for one hour at 70° and finally at 100°, not more than 5 per cent. Ash, not more than 5 per cent.

Action and Uses.—Totaquine is administered by the mouth in benign and malignant tertian malaria, but it possesses no advantages over quinine except that of cheapness. It was introduced with the intention of providing a cheap substitute for quinine for use in India, etc.

Dose.– 0·06 to 0·6 gramme (1 to 10 grains).

TOXINUM DIPHTHERICUM CALEFACTUM

(Toxin. Diphtheric. Calefact.)

Schick Control

Synonyms—Diphtheria Toxin (Heated) for Schick Test Control; Schick Test Control.

Schick control consists of Schick test toxin subjected to a temperature of not less than 70° for not less than five minutes, which is sufficient to destroy the specific toxin without destroying the non-specific reactive principles. It is prepared from the same batch of toxin as that with which it is issued for use.

Standard, B.P.—Schick Control complies with the tests for sterility described in regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—The Schick control is used to distinguish between the true Schick reaction due to the absence of antitoxin and the *pseudo* reaction due to the susceptibility to the bacterial proteins.

Dose.– 0·2 millilitre (3 minims), by intradermal injection.

TOXINUM DIPHTHERICUM DETOXICATUM

(Toxin. Diphtheric. Detoxicat.)

Diphtheria Prophylactic

Diphtheria prophylactic consists of the sterile filtrate or a preparation of the filtrate from a broth culture of *Corynebacterium diphtheriæ*, so modified by physical or chemical means or by the addition of antitoxin that it is non-toxic but antigenic, that is, no symptoms follow injection but immunity results. The following are the chief types of diphtheria prophylactic:—

(*a*) Diphtheria toxin-antitoxin mixture is prepared by adding diphtheria antitoxin to the filtrate from a culture of *C. diphtheriæ*. This form of diphtheria prophylactic is not much used in Great Britain although it has been very widely used in America. Its great disadvantage is that when stored below 0° it may become dangerously toxic owing to destruction of the antitoxin; other forms of diphtheria prophylactic are stable at this temperature.

(*b*) Diphtheria toxoid, or anatoxin, is a harmless modification of diphtheria toxin present to a varying degree in all filtrates from cultures of *C. diphtheriæ*, and as filtrates "age" more toxin changes into toxoid. The usual method of producing this change completely is by the action of 0·2 per cent. formaldehyde solution upon the toxin (without other preservative) for a period of three to four weeks at a temperature of 27°. The optimum quantity of formaldehyde and the time required to change all the toxin into toxoid varies slightly according

to the type of nutrient broth used in the preparation of the toxin (broth prepared from horse flesh is not used because of the possibility of sensitising individuals to subsequent injections of horse serum). The action of formaldehyde is considered complete and the filtrate contains only toxoid and toxin when no symptoms follow the injection into guinea-pigs of 5 millilitres subcutaneously and 0·2 millilitre intradermally. When this stage is reached, the product is filtered through porcelain candles and tested for non-toxicity, sterility and immunising value. The toxoid thus prepared by the action of formaldehyde is referred to as formol-toxoid; in France, the same material is termed "anatoxine." Diphtheria toxoid is a clear liquid of a colour slightly darker than that of the broth from which it is prepared.

(*c*) Diphtheria toxoid-antitoxin mixture consists of toxoid sufficiently neutralised by antitoxin and suitably diluted in physiological solution of sodium chloride. The antitoxin may be derived from the serum of immunised horses or other animals. Diphtheria toxoid-antitoxin mixture is a clear and almost colourless liquid.

(*d*) Diphtheria toxin-antitoxin floccules are prepared by mixing diphtheria antitoxin and the filtrate from a broth culture of *C. diphtheriæ* in the proportion necessary to produce flocculation, separating the floccules, washing and suspending them in physiological solution of sodium chloride.

(*e*) Diphtheria toxoid-antitoxin floccules consist of a suspension in physiological solution of sodium chloride of the precipitate formed when toxoid is mixed with antitoxin in suitable proportions. Toxoid-antitoxin floccules are a fine suspension of white particles in a colourless liquid.

Diphtheria prophylactic is **stored** in glass containers sealed so as to exclude bacteria. If the container includes more than one dose and allows successive doses to be withdrawn, an antiseptic is added which is at least as effective as 0·5 per cent. w/v of phenol. In the form of toxin-antitoxin mixture, diphtheria prophylactic retains its potency for not less than eighteen months when stored between 0° and 10°; when stored below 0°, it may become dangerously toxic. The undiluted toxoid, stored at room temperature, retains its potency for not less than two years.

Standard, B.P.—All forms of diphtheria prophylactic comply with tests to ensure that the toxicity has been sufficiently reduced and that the potency as an immunising antigen has been preserved, as described in regulations made under the Therapeutic Substances Act, 1925. The toxicity is determined by injection into guinea-pigs. Five times the adult dose, injected subcutaneously into each of five guinea-pigs weighing 250 to 350 grammes, should not cause the death of any within six days. If any die from the specific toxæmia within thirty days following the injection, the test is repeated, giving one adult dose to each of five guinea-pigs. It should not cause any death within thirty days. An injection into each of ten guinea-pigs of five times the adult dose, or of one-tenth the adult dose repeated after an interval of not more than four weeks, confers an immunity which is indicated by the production of a

Schick-positive reaction in not more than two of the animals after the injection of one test dose of Schick test toxin, or by the death of not more than two of the animals after the injection of five lethal doses of diphtheria toxin. The immunity tests are made at about the sixth week after the single injection, or at about the third week after the second of the two injections. Diphtheria toxoid is a more potent antigen than most of the other types of prophylactic, but there is not yet any standard method of testing. The combining power with antitoxin measured by the flocculation reaction forms an indication of antigenic value. The immunising value of different batches of toxoid can be compared by testing the amount of antitoxin produced in guinea-pigs at a definite interval after subcutaneous injection. Toxoid-antitoxin mixture and toxoid-antitoxin floccules can be compared by testing the rapidity with which guinea-pigs become Schick-negative after subcutaneous injection (immunity index method).

Action and Uses.—Diphtheria prophylactic is used for active immunisation against diphtheria. For this purpose, it is necessary to present diphtheria toxin in a harmless form, either in combination with antitoxin or modified to toxoid. A person who gives a negative reaction to the Schick test is considered to be immune to diphtheria. In a person not immune a single injection of diphtheria prophylactic produces this degree of immunity only if the individual is already partly immune through natural causes. The injection of diphtheria prophylactic into a non-immune person is followed some weeks later by an increased power to respond to subsequent injections. No antitoxin may be produced as a result of the first injection, but a second or third injection given three or four weeks later results in antitoxin production. Except in the case of young children, it is usual to conduct a Schick test before employing diphtheria prophylactic. Persons who give a positive reaction to this test receive two or more doses of diphtheria prophylactic and are again Schick-tested after the lapse of some weeks to ascertain if immunity has been established.

Diphtheria toxoid is one of the most widely used forms of diphtheria prophylactic and the usual system of dosage is 1 millilitre (15 minims) subcutaneously, followed three weeks later by a second dose of 1 millilitre, and one to two weeks later by a third dose of 1 millilitre. Immunity is usually established five or six weeks after the third dose. Many adults are susceptible to material in the prophylactic other than specific toxoid, and severe reactions may follow injection of doses of 1 millilitre. It is, therefore, advisable to test the susceptibility of all adolescents by the so-called Moloney test, a preliminary injection of a small quantity (0·1 millilitre or less) of the toxoid diluted with normal saline, and any reaction occurring within 24 to 48 hours must be taken as indicating that toxoid is unsuitable for that individual and toxoid-antitoxin floccules should be used instead. A non-specific reaction occurs least frequently after toxoid-antitoxin floccules, most frequently after toxoid. In the case of diphtheria toxoid-antitoxin mixture, it is usual to give three doses, each of 1 millilitre, with an interval of a week between each

dose. Immunity is established about ten or twelve weeks after the third dose.

Dose.– The volume indicated on the label, on two or three occasions, at interyals of two or four weeks, by subcutaneous injection.

TOXINUM DIPHTHERICUM DIAGNOSTICUM

(Toxin. Diphtheric. Diagnost.)

Schick Test Toxin

Schick test toxin is a sterile filtrate from a culture on nutrient broth of *Corynebacterium diphtheriæ*, which is diluted before use with an appropriate solution of sodium chloride so that the test dose is contained in 0·2 millilitre (3 minims). The toxin from which the dilution is prepared is allowed to mature for at least a year until it has become relatively stable. Dilutions in physiological saline solution are very unstable. The use of buffer solutions, such as isotonic borax and boric acid solution, greatly increases the stability of toxin dilutions and appropriate dilutions remain stable for several months at room temperature.

Schick test toxin is supplied in both undiluted and diluted forms. In the undiluted form, Schick test toxin occurs as a clear, yellow liquid free from suspended particles. The diluted toxin is a clear, colourless liquid. It should be **stored** in glass containers sealed so as to exclude bacteria. The undiluted form is supplied with an accompanying container of a sterile solution of sodium chloride of the required strength and volume to give, when mixed with the undiluted toxin, a solution isotonic with blood and containing one test dose in 0·2 millilitre (3 minims). This procedure is dangerous because the amount issued approaches the human fatal dose, and it is undesirable because the physician cannot dilute the toxin with any degree of accuracy. The issue of Schick toxin diluted in buffer solutions can replace the issue of toxin to be diluted before use. If undiluted, it retains its potency for six months when stored at a temperature not exceeding 10°. When diluted with sodium chloride solution only, it loses its potency in a few days even in the ice-chest. When diluted with a buffer solution rendered isotonic with blood by the addition of sodium chloride, it retains its potency for at least two months at temperatures not exceeding 25°.

Standard, B.P.—Schick test toxin complies with tests for sterility described in regulations made under the Therapeutic Substances Act, 1925. One test dose, mixed with $\frac{1}{1250}$ unit or less of diphtheria antitoxin and injected into guinea-pigs, gives a positive Schick reaction, but no reaction of any kind when mixed with $\frac{1}{750}$ unit or more of the antitoxin. When injected into guinea-pigs without admixture with antitoxin, a positive Schick reaction is obtained with one twenty-fifth but not with one fiftieth of a test dose.

Action and Uses.—The Schick test is employed for the detection of susceptibility to diphtheria. Very small amounts of diphtheria toxin (from one thousandth to one millionth of a millilitre of a toxin of moderate strength), injected intracutaneously into a non-immune individual, or into a normal guinea-pig or rabbit, will cause a definite reaction—a red flush 10 millimetres or more in diameter. Slightly larger doses cause a larger area of reaction, followed by staining and slight desquamation. A further increase in dose causes necrosis, and a still larger dose may cause death. It is necessary, therefore, to limit the amount of toxin injected in the Schick test. In practice it has been found that no inconvenient reactions are caused in man if one-fiftieth of the Schick dose causes no reaction when injected into the skin of a normal guinea-pig. Further, it has been found that definite reactions, easily read, follow the injection intracutaneously into man of that dose of toxin of which one twenty-fifth causes a definite flush when injected into the skin of a normal guinea-pig. If the blood of an individual contains sufficient antitoxin, the injection of a fixed amount of toxin does not produce a reaction. The injection of a safe dose of toxin can therefore be used as the basis of a test for the presence or absence of a certain amount of antitoxin. The concentration of antitoxin in the blood of an individual, which determines the presence or absence of a reaction, does not depend on the specific toxin content of the material injected. The amount of antitoxin with which any culture filtrate combines, depends on the amount of toxin present together with the toxoid, i.e., that modification of toxin which occurs when a toxin "ages" or is chemically changed and which, although capable of combination with antitoxin, is not poisonous and will not cause death, œdema or skin lesion. The Schick dose must consequently be defined in terms of its combining power with antitoxin. A mixture of one test dose of Schick toxin with $\frac{1}{75}$ unit of antitoxin must cause no reaction, and a similar mixture with $\frac{1}{125}$ unit of antitoxin must give a definite flush when injected into the skin of normal guinea-pigs.

The Schick test is carried out by the intradermal injection of 0·2 millilitre of Schick test toxin. The antero-internal aspect of the forearm is a convenient site for the injection and the skin should first be cleansed with alcohol or soap and water.

Such an injection causes no reaction in man if the individual is immune to diphtheria. If the individual is not immune, the injection is followed by a red flush, 10 to 20 millimetres in diameter, visible twenty-four to thirty-six hours later. This fades and becomes brown, and desquamation may follow. The test is complicated by the fact that many people, particularly adults, are sensitive to constituents of the test material other than the specific toxin. The diphtheria bacillus, when cultivated on artificial media, produces, in addition to specific toxin and toxoid, bacterial proteins and possibly other metabolic products. These products are more heat-stable than the specific toxin, and a true Schick reaction can be distinguished from a non-specific pseudo-reaction by a comparison between the reactions produced by the Schick test toxin

and the Schick control. The reaction obtained by the injection of Schick test toxin into one forearm is compared with the reaction obtained by the injection of Schick control into the other.

The reaction is interpreted as follows:—

(*a*) *Negative*, if there is no reaction in both arms.

(*b*) *Positive*, if there is no reaction on the control arm, but a red flush begins to develop on the test arm after twenty-four to thirty-six hours and reaches its maximum in four days. At this time it is a circumscribed area measuring 10 to 20 millimetres in diameter. During the next seven to ten days it fades slowly, showing superficial scaling and a persistent, brownish pigmentation.

(*c*) *Pseudo*, or *negative and pseudo*. A red flush develops rapidly in twenty-four hours equally on each arm, but is less circumscribed than the positive reaction. By the fourth day it has practically disappeared, often leaving a reddish or brownish pigmentation.

(*d*) *Combined*, or *positive and pseudo*. The pseudo effect develops rapidly on both arms, and as this fades the positive reaction develops on the test arm. In this way, the test arm tends to acquire the characters of the true positive, while the control arm is clearing up. If it is possible to take a reading on one occasion only, this should be done not earlier than the fourth day and not later than the seventh. In most cases the pseudo reaction will have subsided by this time.

The conclusions drawn from these results are as follows:—If the result is *negative*, or *negative and pseudo*, the patient is immune; if *positive* or *positive and pseudo*, the patient is susceptible. The Schick test is not considered an essential preliminary to immunisation for children under six months of age, since usually they are naturally immune to diphtheria, or for children between the ages of six months and six years since the majority of children between these ages give a positive Schick reaction. Above six years of age, immunity varies greatly and the test should always be conducted.

Dose.– 0·2 millilitre (3 minims), by intradermal injection.

TOXINUM SCARLATINUM

(Toxin. Scarlatin.)

Streptococcus Toxin (Scarlatina)

Synonym—Scarlet Fever Streptococcus Toxin.

Streptococcus toxin (scarlatina) is the diffusible exotoxin obtained from a broth culture of a good toxin-producing strain of *Streptococcus hæmolyticus scarlatinæ*. A potent toxin may be prepared by growing the streptococcus in peptone broth (*p*H 7·5), with 5 per cent. of sterile, defibrinated rabbit's blood. The culture is centrifuged, the supernatant liquid is filtered through a Berkefeld filter,

and to the filtrate 0·5 per cent. of phenol is added as a preservative. Streptococcus toxin (scarlatina) should be **stored** at as low a temperature as possible. If kept in an ice-chest in the dark it can be regarded as of full potency for two to three months. The toxin should be issued in sterilised glass containers sealed so as to exclude bacteria and marked with a date beyond which the toxin is not intended to be used.

Standard.—Streptococcus toxin (scarlatina) complies with the tests for sterility described in regulations made under the Therapeutic Substances Act, 1925. The potency of the toxin is expressed in terms of skin-test doses (S.T.D.). One skin-test dose is the amount of toxin which, when injected intradermally, will give a zone of erythema, 10 millimetres or more in diameter, in the majority of susceptible persons.

Action and Uses.—Streptococcus toxin (scarlatina) is used in the Dick test for susceptibility to scarlet fever. For this purpose the toxin should be diluted with normal saline solution (approximately 1 in 1000), so that a skin-test dose is contained in 0·1 to 0·2 millilitre (1½ to 3 minims). The technique of the injections is practically the same as that employed for the Schick test. The skin in front of the forearms is carefully cleansed with ether or alcohol, and 0·2 millilitre (3 minims) of the diluted toxin is injected intradermally into one arm. Sometimes 0·2 millilitre of control fluid, consisting of diluted toxin which has been inactivated by heating to 96° for from two to four hours, is injected into the other arm, but in view of the rarity of pseudo-reactions it is generally agreed that the use of such a control is not necessary. The positive reaction develops in from three to twelve hours as a bright red flush with average dimensions of 20 to 30 millimetres. It has usually reached its maximum in eighteen hours and then rapidly fades.

In the Dick-negative individual there is no significant reaction on either arm. About 20 per cent. of children at the age of two, and 70 to 90 per cent. of adults, are Dick-negative. The Dick test is positive in some 80 per cent. or more of patients suffering from definite scarlet fever during the first two days of the attack, and usually becomes negative at about the sixth to twelfth day. In a few cases it may remain positive for several weeks or even throughout the disease. The change from positive to negative in the course of an illness with rash is, however, diagnostic of scarlet fever. The detection of susceptible contacts and others by means of the Dick test and their passive immunisation by means of streptococcus toxin (scarlatina) are important administrative measures in the control of scarlet fever. In hospitals it is becoming increasingly common to immunise the nursing staff and others liable to be exposed to infection; active immunisation has afforded protection in many institutions and the immunity so acquired has continued for a considerable period. Subjects with a negative reaction, either natural or following immunisation, are almost invariably immune against scarlet fever.

Streptococcus toxin (scarlatina) is also used for active immunisation of persons who react positively to the Dick test. For this purpose the toxin

should be diluted so that the required dose is contained in a volume convenient for injection. From three to five doses of toxin are usually given at weekly intervals, although the interval between the later doses is sometimes lengthened to a fortnight. It is generally agreed that the initial dose should be 500 skin-test doses or, if the patient gives a strongly positive reaction to the Dick test, 250 skin-test doses, injected subcutaneously or, preferably, intramuscularly. Subsequent doses gradually increasing up to 20,000 or even 80,000 skin-test doses should be given to complete the course. If the patient has shown a large positive reaction and the dose is increased too rapidly, he may show the "scarlatinoid syndrome," namely, vomiting, malaise and a scarlatiniform rash which disappears in twenty-four to forty-eight hours. The majority of positive reactors apparently become negative within a few weeks of the last dose and remain so for at least twelve months. It is advisable to Dick test those specially exposed, such as nurses, every year, and if positive, to give a further injection of 20,000 skin-test doses or more. In some cases the injection of immunising doses of the toxin is followed by a reaction; it is said that this can be prevented by injecting 0·2 to 0·3 millilitre (3 to 5 minims) of solution of adrenaline hydrochloride with the toxin.

TRAGACANTHA
(Trag.)

Tragacanth

Synonym—Gum Dragon.

Tragacanth is the dried, gummy exudation obtained by incision from *Astragalus gummifer* Labill. and some other species of *Astragalus* (Fam. Leguminosæ), and is known in commerce as Persian tragacanth. The species of *Astragalus* are shrubs indigenous to Greece, the Turkish Empire and Persia. The cell walls of the pith and medullary ray cells undergo gummosis, when they swell by the absorption of water and exert considerable pressure in the interior of the stem, the gummy substance eventually forcing its way through natural crevices or artificial incisions in the bark. The exudation is collected when dry and graded. That which has been exuded through elongated incisions dries in flakes and is known as "flake" tragacanth, in which form alone it is official.

Tragacanth occurs in thin, flattened, more or less curved, ribbon-like flakes, about 25 millimetres long and 12 millimetres broad. It is white or pale yellowish-white, horny, translucent, marked on the flat sides with concentric ridges, and breaks with a short fracture. It is odourless and tasteless. Tragacanth is only sparingly soluble in water, but swells into a homogeneous, adhesive, gelatinous mass; it usually contains a small amount of starch which stains with N/50 iodine and then appears as minute, scattered, blue specks, the remainder of the tragacanth staining yellow.

The diagnostic **microscopical** characters are the gradual swelling and extension of the angular particles of the powdered drug until their form eventually disappears, when mounted in water; the presence of only a few groups of small, rounded starch grains; the absence of any colouration when mounted in solution of ruthenium red.

The **composition** of tragacanth has not yet been satisfactorily ascertained. The part soluble in water appears to consist chiefly of polyarabinantrigalactangeddic acid and yields on hydrolysis arabinose, galactose and geddic acid. The portion insoluble in water yields, under the influence of baryta water, isomeric α- and β-tragacanthanxylan-bassoric acids, which yield on hydrolysis tragacanthose, xylose and bassoric acid. Traces of starch and of altered cellulose are also to be found in the gum.

Substitutes.—"Vermicelli" tragacanth is composed of tears and vermiform pieces which have been formed by exudation through more or less rounded holes. Smyrna tragacanth occurs in flakes, but is more opaque and less ribbon-like than the official drug; it contains appreciable quantities of starch. Hog gum, or Caramania gum, occurs in yellowish or yellowish-brown, opaque tears or vermiform pieces, which are occasionally whitened by dusting them with lead carbonate; it is said to be obtained from a species of *Prunus* (Fam. Rosaceæ). Indian tragacanth (sterculia gum; Karaya gum) is obtained from *Sterculia urens* Roxb. (Fam. Sterculiaceæ). It occurs in irregular, striated, often vermiform, whitish or pinkish-brown pieces, occasionally with fragments of bark attached; it has a distinctly acetous odour. Boiled with solution of potassium hydroxide it assumes at most a slight brownish colour, whereas tragacanth turns canary-yellow; when the powder is mounted in solution of ruthenium red, the particles are stained bright pink. The volatile acidity, after hydrolysis with 5 per cent. phosphoric acid, is about 18 per cent., calculated as acetic acid; tragacanth gives only from 2 to 3 per cent. Indian tragacanth yields from 5 to 6 per cent. of ash.

Standard, B.P.—Tragacanth contains not more than 2 per cent. of foreign organic matter. When powdered, it does not acquire a pink colour in solution of ruthenium red. Ash, not more than 4 per cent.

Tragacanth, in powder (Pulvis Tragacanthæ : Pulv. Trag.), possesses the microscopical characters of Tragacantha, and complies with the limit for ash and the reaction with ruthenium red of the unground drug.

The following test provides a useful means of comparing specimens of tragacanth, but it is necessary that tests should be carried out at the same time and under exactly the same conditions if comparative results are to be obtained:—The tragacanth should be in the form of powder, or, if in flake form, should be reduced to a powder which passes a No. 30 sieve and is retained by a No. 60 sieve. Prepare a mucilage of 1·25 per cent. strength as described in the British Pharmacopœia for Mucilago Tragacanthæ; heat for one hour on a boiling water-bath, with occasional stirring, pour it into a 50 millilitre Nessler cylinder and allow it to stand overnight. At the surface of this mucilage release a steel ball, $\frac{5}{32}$ inch in diameter, and take the time of fall from a point 1·5 inches to a point 4 inches below the upper surface; the time required is from 50 to 150 seconds for average specimens of tragacanth when freshly powdered. Occasional specimens give much higher results.

Uses.—Tragacanth is employed in pharmacy as a suspending agent

in mixtures containing resinous tinctures and heavy insoluble powders, or to emulsify volatile oils. Mucilage of tragacanth and compound powder of tragacanth are used for these purposes, the latter combining the suspending powers of tragacanth and acacia, while the starch present tends to prevent agglomeration of the deposit. It is not a suitable emulsifying agent for fixed oils since the resulting emulsions are very coarse, but it is commonly incorporated in emulsions prepared with acacia in order to retard creaming. The mucilage of tragacanth is an efficient suspending agent for the resins of tincture of jalap and tincture of myrrh; it is also employed instead of acacia when substances incompatible with the latter are present. In some cases, mucilage of tragacanth answers better than mucilage of acacia, or a mixture of the two mucilages may give the best results, as with compound tincture of benzoin and tincture of tolu. It is worthy of note that the addition of mucilage of acacia to mucilage of tragacanth produces a thinner mixture than the addition of a similar quantity of water. Mucilage of tragacanth is preferred to mucilage of acacia for use in lotions for external use. With essential oils, tragacanth forms coarse emulsions which separate on standing, but are readily miscible. The following procedure may be followed:—Add the gum to the oil in a dry bottle in the proportion of 1 part of tragacanth to 10 parts of oil, shake, add 72 parts of water and agitate vigorously; then add water in successive portions to produce the required volume.

Tragacanth is largely used as a constituent of glycerin toilet creams and jellies. It is also used to form a drying application to the skin, which may be used as a basis for ichthammol, salicylic acid, resorcinol, sulphur, etc. A typical preparation, known as Bassorin Paste or Linimentum Exsiccans, is made by mixing in a wide-mouthed bottle 5 parts of tragacanth, in powder, with 10 parts of alcohol, adding 70 parts of water, shaking vigorously and adding 2 parts of glycerin with sufficient water to make 100 parts. It dries on the skin, forming a transparent film easily removed by washing. A somewhat similar preparation, known as Gelanthum or Unna's Jelly, contains tragacanth, gelatin, glycerin and water, with a little thymol; it is used as a base for skin medication. Tragacanth is used sparingly as an excipient to bind pill masses; glycerin of tragacanth is a useful excipient which should be used in the smallest possible quantity, the mass being well kneaded. Glucanth is a pill excipient prepared by mixing 1 part of tragacanth, in powder, with 1 part of distilled water and 4 parts of syrup of liquid glucose. Tragacanth is also used as the basis of lubricants for catheters and surgical instruments. It is also used for supporting dentures.

Preparations

Glycerinum Tragacanthæ, B.P.C.—(Glycer. Trag.)—Glycerin of Tragacanth. About 1 in 5½.

This glycerin was included in the British Pharmacopœia, 1914.

Lotio Tragacanthæ, B.P.C.—(Lot. Trag.)—Tragacanth Lotion. *Syn.*—Lotio Emolliens. Tragacanth, about 0·5 per cent. w/v, with spirit of chloroform, tincture of tolu, Cologne spirit, glycerin and distilled water.

Mucilago Tragacanthæ, B.P.—(Mucil. Trag.)—Mucilage of Tragacanth. Tragacanth, 1·25 per cent. w/v, with alcohol, in chloroform water. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Pasta Tragacanthæ Composita, B.P.C.—(Past. Trag. Co.)—Compound Tragacanth Paste. *Syn.*—Pasta Lubricans; Catheter Lubricant. Tragacanth, 1 per cent. w/v, and boric acid, 3 per cent. w/v, with oil of lavender, glycerin and decoction of chondrus.

Pulvis Tragacanthæ Compositus, B.P.—(Pulv. Trag. Co.)—Compound Powder of Tragacanth. Tragacanth, 15 per cent., and acacia, 20 per cent., with starch and sucrose. Dose.– 0·6 to 4 grammes (10 to 60 grains).

TRIETHANOLAMINA
(Triethanolamin.)

Triethanolamine

Triethanolamine, as obtainable in commerce, is a mixture of bases consisting principally of trihydroxytriethylamine, $(CH_2 \cdot CH_2 \cdot OH)_3N$, together with small proportions of dihydroxydiethylamine and monohydroxyethylamine. It may be prepared by the action of ammonia on ethylene chlorhydrin. Triethanolamine occurs as a clear, colourless, syrupy, almost odourless liquid, which is strongly alkaline to litmus, volatilises only slowly at 100° and has a specific gravity of about 1·12. It forms crystalline salts with mineral acids; the hydrochloride is only sparingly soluble in alcohol and, after washing several times with this solvent, melts at about 173°to174°. Moderately strong solutions in excess of dilute hydrochloric acid yield a copious white precipitate with phosphotungstic acid, a slight precipitate with iodine solution, and no precipitate with Mayer's reagent or solution of platinic chloride. With the higher fatty and olefinic acids it forms salts, such as triethanolamine stearate, which are soluble in water and have the general characters of soaps.

Miscible with water and alcohol; only slightly soluble in ether and benzene.

Uses.—Triethanolamine has the general properties of the aliphatic bases and, on account of its being less volatile, it possesses certain advantages over ammonia and the volatile organic bases. It has been used in toilet preparations as a substitute for ammonia and in combination with fatty and olefinic acids as an emulsifying agent for oils and fats.

TRIETHANOLAMINÆ STEARAS.—Triethanolamine stearate, or ethanolamine stearate, may be prepared by the interaction of triethanolamine and stearic acid, and occurs as a yellowish-brown solid having a wax-like consistence. It is readily soluble in water, and is decomposed by mineral acids, giving a salt of the base and free stearic acid. It forms an excellent emulsifying agent for use in liquid toilet preparations, forming very stable emulsions with fats, oils, paraffins, etc., and is used as an ingredient of creams and polishes to replace the ordinary soaps.

TRINITROPHENOL

(Trinitrophen.)

Trinitrophenol

$C_6H_3O_7N_3 = 229{\cdot}0$

Synonyms—Acidum Picricum; Picric Acid; Carbazotic Acid.

Trinitrophenol is 2 : 4 : 6-trinitrophenol, $C_6H_2(OH)(NO_2)_3$, and may be obtained by the nitration of phenol. It occurs as a bright yellow, crystalline powder without odour and having a very bitter taste. The aqueous solution has an acid reaction and, unlike phenols, trinitrophenol liberates carbon dioxide from carbonates. The solution has an intensely yellow colour and stains the skin, the colour deepening on the addition of alkali. Trinitrophenol burns readily and explodes if heated rapidly or subjected to percussion. It forms very insoluble compounds with many alkaloids and precipitates proteins in the cold, the precipitate becoming denser on heating. It forms salts with metals, some of which are very explosive, and addition compounds with many polynuclear hydrocarbons, such as naphthalene and anthracene. The sale and storage of trinitrophenol and its derivatives are subject to legal restrictions except in the case of small quantities. It may be **stored** mixed with an equal weight of water.

Soluble in water (about 1 in 90), alcohol (90 per cent.) (about 1 in 10) and ether (1 in 25).

Standard, B.P.—Trinitrophenol contains not less than 99 per cent. of $C_6H_3O_7N_3$. Melting-point, 121° to 123° (the operator should be protected by a glass screen when making this determination). Residue on extraction with benzene at 50°, not more than 0·1 per cent. It complies also with a limit test for sulphate.

Action and Uses.—Trinitrophenol is an irritant to the skin and mucous membranes. Taken **internally**, it may produce nausea, vomiting and diarrhœa; after absorption it stains the skin and mucous membranes a yellow colour, simulating jaundice. The urine is coloured either yellow or red and may contain casts, blood cells and albumen, but no bile. It has been employed internally in malaria and exophthalmic goitre, and as an antipyretic, but for these purposes it is inferior to other drugs. Occasionally it is used as a bitter tonic in doses of 0·06 gramme (1 grain). It may be administered in the form of a mixture, although its internal administration is not generally to be recommended. **Externally**, a 1 per cent. w/v aqueous solution (Lotio Trinitrophenolis) is applied on absorbent gauze or lint to wounds and burns of the first and second degrees, but should not be applied over large surfaces, since toxic symptoms may arise from absorption. The lotion is also applied to the skin in eczema, erysipelas and other inflammatory conditions. The principal use of trinitrophenol is as an antiseptic for the skin before operations. A 1 to 3 per cent. w/v solution in alcohol or a 1 per cent. w/v solution in water is used for skin sterilisation in practically

the same way as weak solution of iodine. Skin eruptions of a morbiliform type have been observed in a few cases after its use. Trinitrophenol ointment has been applied to the eyes for burns, especially those caused by quicklime. A 5 per cent. w/v solution in alcohol has been recommended for hyperhidrosis of the feet.

Trinitrophenol is used in the form of a saturated aqueous solution as a hardening agent and as a stain in microscopical work, and it is also employed in urine analysis for the detection and determination of glucose, the determination of albumin, and for the detection and determination of creatinine. Recent stains on the skin caused by trinitrophenol may be removed by means of a solution containing 1 per cent. each of boric acid and sodium benzoate or by a paste of magnesium carbonate with water.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

Preparations

Carbasus Trinitrophenolis, B.P.C.—(Carbas. Trinitrophen.)—Trinitrophenol Gauze. *Syn.*—Picric Gauze; Picric Acid Gauze. It contains from 1·5 to 2·5 per cent. of trinitrophenol.

Liquor Trinitrophenolis, B.P.C.—(Liq. Trinitrophen.)—Solution of Trinitrophenol. *Syn.*—Liquor Acidi Picrici; Solution of Picric Acid. Trinitrophenol, 5 per cent. w/v, in alcohol (90 per cent.).

Lotio Trinitrophenolis, B.P.C.—(Lot. Trinitrophen.)—Lotion of Trinitrophenol. *Syn.*—Lotio Acidi Picrici; Picric Acid Lotion. Trinitrophenol, 1 per cent. w/v, in distilled water.

Unguentum Trinitrophenolis, B.P.C.—(Ung. Trinitrophen.)—Trinitrophenol Ointment. *Syn.*—Unguentum Acidi Picrici; Picric Acid Ointment. Trinitrophenol, 2 per cent., and distilled water, in yellow soft paraffin.

TRYPARSONUM

(Tryparson.)

Tryparsone

$$C_8H_{10}O_4N_2AsNa,\tfrac{1}{2}H_2O = 305{\cdot}0$$

Tryparsone, $NaO(OH)\cdot AsO\cdot C_6H_4\cdot NH\cdot CH_2\cdot CONH_2,\tfrac{1}{2}H_2O$, is sodium N-phenyl glycineamide-*p*-arsonate and may be prepared by boiling an aqueous solution of sodium-*p*-aminophenylarsonate with chloracetamide, converting the resulting N-phenyl-glycineamide-*p*-arsonic acid into its sodium salt and crystallising from dilute alcohol. It is a white, crystalline powder, without odour and stable in air.

Readily **soluble** in water (3 in 10), the aqueous solution being neutral to litmus; insoluble in alcohol.

Standard.—Tryparsone contains not less than 25·1 per cent. and not more than 25·5 per cent. of arsenic, and not less than 9·25 per cent. and not more than 9·5 per cent. of nitrogen, both calculated on the substance dried at 105° to 110°. Loss on drying at 105° to 110°, not less than 2·5

per cent. and not more than 3·5 per cent. 1 gramme dissolved in 20 millilitres of water remains clear on the addition of 5 millilitres of magnesium ammonio-sulphate solution in the cold (absence of soluble inorganic arsenates); on heating, a white precipitate is produced. To 0·25 gramme dissolved in 5 millilitres of water add 5 drops of a 10 per cent. w/v solution of sodium nitrite, cool to below 5° and add 5 millilitres of dilute hydrochloric acid followed by a solution of 0·5 gramme of betanaphthol in 10 millilitres of 2N sodium hydroxide; no red colour is produced (absence of arsanilic acid). A solution of 1 gramme in 20 millilitres of water is not darkened by the addition of hydrogen sulphide. It complies also with the test for toxicity.

Assay.—For arsenic. Cautiously heat about 0·2 gramme, accurately weighed, in a 600 millilitre conical flask with 7·5 millilitres of sulphuric acid and 1·5 millilitres of fuming nitric acid for forty-five minutes; add a further 10 to 15 drops of fuming nitric acid and continue heating more strongly for fifteen minutes; cool the solution, add 5 grammes of ammonium sulphate, gently warm the mixture until the reaction ceases, and then dilute to about 60 millilitres with water; add 1 gramme of potassium iodide and boil the solution, carefully avoiding any possible loss owing to spraying, until the liquid assumes a pale straw-colour, add one or two drops of N/10 sodium thiosulphate to render the solution colourless and dilute the solution to about 120 millilitres with water; add 50 millilitres of 4N sodium carbonate, followed by a slight excess of sodium bicarbonate, and titrate the solution with N/10 iodine using starch solution as indicator; each millilitre of N/10 iodine is equivalent to 0·003746 gramme of As.

For nitrogen. Dissolve about 0·3 gramme, accurately weighed, in 30 millilitres of sulphuric acid, add 10 grammes of potassium sulphate and a small globule of mercury and heat the mixture for about eight hours or until colourless; when cold dilute the solution with water to about 250 millilitres, make alkaline by the addition of 10N sodium hydroxide, add 1 millilitre of solution of sodium sulphide, distil the liberated ammonia into 25 millilitres of N/10 sulphuric acid and titrate the solution with N/10 sodium hydroxide, using methyl red as indicator; each millilitre of N/10 sulphuric acid is equivalent to 0·001401 gramme of N.

Test for toxicity.—A dose equivalent to 0·75 gramme per kilogram of body weight, injected intravenously into a rabbit, produces no toxic symptoms.

Action and Uses.—Tryparsone was introduced for the treatment of sleeping sickness (trypanosomiasis) and, because of its value in the nervous manifestations of this disease, its use in syphilitic affections of the nervous system was suggested. There is general agreement that in cases of general paresis and tabes treatment with tryparsone is of considerable value, better results being obtained than with the arsphenamines. It has also been used with considerable success in other forms of neurosyphilis. It may be combined with malarial treatment. It has

been shown to be useless in primary and secondary syphilis, since its administration in these stages appears to have no effect on the spirochætes in the secretion from the various lesions. On account of the liability of the drug to produce optic atrophy, caution should be observed when using it for cases of neurosyphilis with optic involvement.

Tryparsone is preferably **administered** intravenously, although it may be given intramuscularly. If given by the mouth it is less active and may produce diarrhœa and vomiting. In the treatment of neurosyphilis, doses of 2 to 3 grammes (30 to 45 grains) are administered up to a total of 130 grammes or more, usually in courses of eight to ten doses. In cases of trypanosomiasis, if treatment is commenced early, a total of 20 to 40 grammes may suffice to effect a cure, but in chronic cases 50 to 100 grammes may be necessary; it is administered in doses of 3 grammes (45 grains) once a week, in courses of eight injections. It is against *Trypanosoma gambiense* that tryparsone produces its sterilising action. If the infection is due to *Trypanosoma rhodesiense*, tryparsone fails to sterilise either the peripheral blood or the cerebrospinal fluid.

Numerous toxic effects of tryparsone have been described, the chief of which is amaurosis, which may go on to complete blindness. Occasionally vomiting and slowing of the pulse occur immediately after the injection, as is seen in the case of the arsphenamines. Vasomotor effects, fever, headache, diarrhœa, vomiting and delirium are sometimes met with. Excretion is rapid in the majority of persons, 90 per cent. of the drug being excreted in the urine within twenty-four hours. Occasionally the excretion may be slower.

Dose.– 0·5 to 3 grammes (8 to 45 grains), by intravenous injection.

TRYPSINUM
(Trypsin.)

Trypsin

Trypsin is a proteolytic enzyme secreted by the pancreas and may be isolated in a state of comparative purity from the fresh and healthy pancreas of the hog. It may also be extracted from pancreatin with alcohol (40 per cent.) acidified with phosphoric acid, by digesting for a few hours, filtering, and precipitating with strong alcohol. These processes do not yield a trypsin free from amylolytic power, nor is any commercial trypsin powder free from amylase.

Trypsin occurs in the form of a whitish or yellowish powder, having a pepsin-like odour. It acts with great rapidity on soluble proteins, such as the casein of milk, but slowly on coagulated egg albumen. The action is best promoted in alkaline solution of from *p*H 8·0 to *p*H 9·0 with fibrin or gelatin as a substrate, and at *p*H 6·0 to *p*H 6·5 with casein. Its maximum activity is at *p*H 11·5, but it is rapidly destroyed at this

alkalinity. It is inactive at *p*H 4·0 although it also exercises its properties in neutral or even faintly acid solution. Its activity, however, ceases at once in a medium having the degree of acidity favourable to peptic action. The temperature most favourable to the action of trypsin lies between 37° and 40°, but above 50° it rapidly diminishes, ceasing altogether at 75°. When in the perfectly dry state, however, the ferment does not lose its activity even after heating to 100°. Pure trypsin has no action on starch or dextrose. Trypsin acts on all soluble and on many insoluble proteins, converting them finally into a mixture of amino-acids and relatively simple polypeptides. Its activity may be determined by the process of the British Pharmacopœia for trypsin in Pancreatinum. It has from 4 to 5 times the proteolytic activity of pancreatin.

Slowly but not completely **soluble** in water; insoluble in alcohol and glycerin.

Action and Uses.—Trypsin has been used internally and externally for its digestive action on protein material, but it is now administered with other pancreatic ferments in the form of pancreatin.

Dose.—0·2 to 0·6 gramme (3 to 10 grains).

TUBERCULINUM PRISTINUM

(Tuberculin. Prist.)

Old Tuberculin

Old tuberculin is prepared by growing the tubercle bacillus on a fluid medium containing 5 per cent. of glycerin, at approximately 37° for a period of six weeks or more. The growth should be rapid and abundant. The fluid medium, from which the bacilli may or may not have been previously separated by filtration, is then concentrated by evaporation on a water-bath to one-tenth of its original volume, clarified by filtration and diluted, if necessary, with a 50 per cent. v/v aqueous solution of glycerin. If the potency is less than that of the standard preparation, the product is rejected.

Old tuberculin occurs as a transparent, viscous fluid, yellow to brown in colour, having an odour which resembles that of honey. Old tuberculin has the power of causing illness or death when injected parenterally into tuberculous animals. When injected into the skin of tuberculous animals, it produces erythema, induration, or even necrosis, according to the dose injected and the state of sensitivity of the animal. It is practically innocuous to non-tuberculous animals. It possesses a specific toxicity for animals infected with the tubercle bacillus. Old tuberculin is distributed in sterilised glass phials which are sealed so as to exclude bacteria. In the undiluted state it is a very stable reagent and may be kept for months, or even years, at ordinary temperatures without detectable loss of potency. It should, however, as a matter of precaution,

be **stored** in a cool, dark place; in the diluted state it is unstable and deteriorates at a rate which depends upon the temperature, and dilutions should not be used more than one month after their preparation. When it is prescribed with the suffix T, the old tuberculin dispensed is prepared by growing the human type of bacilli. When the old tuberculin is prescribed with a suffix PT, the old tuberculin dispensed is prepared by growing the bovine type of bacilli. There is, however, no clear evidence that tuberculins prepared from the two types differ as to their active principle.

Standard, B.P.—The potency of old tuberculin is determined by comparing the dose of it necessary to produce its specific toxicity in guinea-pigs or other animals infected with *Bacillus tuberculosis* with the dose of the standard preparation necessary to produce the same effect, as defined in the regulations made under the Therapeutic Substances Act, 1925. It complies also with a test for toxicity and with tests for sterility.

Action and Uses.—Old tuberculin was originally introduced by Koch as a curative agent in the treatment of tuberculosis, but its therapeutic use is not without danger and the consensus of medical opinion appears to be against its efficacy in pulmonary tuberculosis. It is still, however, used in the treatment of tuberculosis of the genito-urinary tract and of tuberculous peritonitis. It is also used as a diagnostic reagent in the tuberculosis of both man and animals. A human being or bovine animal showing significant sensitivity to tuberculin is generally considered to have been infected with the tubercle bacillus, although the infection may not necessarily be active.

Of the several methods which have been employed for performing tuberculin tests in man, those depending upon the development of a skin reaction are now in more general use. In the intradermal method of Mantoux, the tuberculin is injected intradermally. In the Von Pirquet method, the tuberculin is applied to one or more scratches on the skin. In cattle, the test is made by subcutaneous injection, by intradermal injection, or by instillation into the conjunctival sac (Calmette reaction). Owing to the great variation in the sensitivity of man, no exact diagnostic dose can be stated. The intradermal injection of 0·1 millilitre (1½ minims) of a 1 in 10,000 dilution of old tuberculin is commonly given as an initial test. In the absence of a reaction the test may be repeated, using 0·1 millilitre (1½ minims) of a 1 in 1000 dilution, and, if still negative, active tuberculosis may be practically excluded. The subcutaneous injection of diluted old tuberculin in small and gradually increasing doses has been used as a means of effecting non-specific desensitisation in some cases of asthma due to allergy.

An ointment containing 50 per cent. of old tuberculin was formerly used for Moro's diagnostic test. Similar ointments containing from 10 to 50 per cent. of old tuberculin have been used therapeutically. In testing cattle, the double intradermal test has largely superseded other methods of testing. 0·1 millilitre (1½ minims) of undiluted old tuberculin is injected intradermally into a shaved area of the skin of the neck,

or into the skin of the base of the tail. A second injection of 0·1 millilitre (1½ minims) is made into exactly the same site after an interval of from forty-two to seventy-two hours. A positive reaction is denoted by the development of a hard swelling at the site of injection. In the subcutaneous test for diagnosing tuberculosis in cattle, the old tuberculin is usually diluted 1 in 8 with normal saline solution and the reaction is indicated by a rise in temperature of at least 2°F. above the highest temperature recorded before the injection.

Dose.– Diagnostic, 0·001 to 0·005 millilitre ($\frac{1}{60}$ to $\frac{1}{12}$ minim); therapeutic, 0·000001 millilitre ($\frac{1}{60,000}$ minim), gradually increased.

TURPETHUM
(Turpeth.)
Turpeth

Synonyms—Indian Jalap; Turpethi Radix.

Turpeth consists of the dried root and stem of *Ipomœa Turpethum* R. Br. (Fam. Convolvulaceæ), a twining plant growing in India, Ceylon, the Malay Archipelago and Australia.

Turpeth occurs in cylindrical pieces from 1·5 to 5 centimetres in diameter, but the thicker pieces are often split and deprived of the central portion. Externally, the pieces are greyish-brown in colour and deeply furrowed longitudinally, giving the drug a rope-like appearance. The fracture is short in the bark but fibrous in the wood. The smoothed, transverse surface is light brown, showing in the xylem very large vessels and wide medullary rays containing starch. Resin cells and abnormal wood bundles are found in the bark. The drug has a faint odour and a nauseous taste which is slowly developed.

Turpeth **contains** from 5 to 10 per cent. of resin, part of which is soluble in ether. The ether-soluble resin is a mixture of α- and β-turpethein; the ether-insoluble resin has been called turpethin.

Action and Uses.—Turpeth has properties resembling those of jalap, but is slower in its action and rather less powerful. It is used in India and the Eastern Colonies in place of jalap.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

TUSSILAGINIS FLOS
(Tussilag. Flos)
Coltsfoot Flower

Synonym—Farfaræ Flores.

Coltsfoot flower consists of the dried flowering shoots of *Tussilago Farfara* Linn. (Fam. Compositæ), a perennial herb indigenous to

Europe and Central and Northern Asia. The flowers of the coltsfoot appear before the leaves and are collected in the early spring.

The peduncles are simple, about 4 to 15 centimetres long, and bear numerous, linear, entire, reddish bracts up to 1 centimetre long, and cottony hairs each terminating in a small, dark red gland. Each terminal capitulum consists of about 40 central staminate and tubular florets surrounded by about 300 pistillate florets with very narrow, bright yellow, ligulate corollas having rounded apices without teeth. The fruit is crowned with a pappus of colourless, barbed bristles, 3 to 4 cells wide. The flowers are odourless and tasteless. The flowering stems probably **contain** constituents similar to those of the leaves, but the bitter principle present in the leaves is absent from the flowers.

Action and Uses.—Coltsfoot flower has properties similar to those of the leaf and is employed in the preparation of Syrupus Tussilaginis.

Preparations

Extractum Tussilaginis Liquidum, B.P.C.—(Ext. Tussilag. Liq.)—Liquid Extract of Coltsfoot. 1 in 1. Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Syrupus Tussilaginis, B.P.C.—(Syr. Tussilag.)—Syrup of Coltsfoot. Liquid extract of coltsfoot, 1 in 4, in syrup. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

TUSSILAGINIS FOLIUM

(Tussilag. Fol.)

Coltsfoot Leaf

Synonym—Farfaræ Folia.

Coltsfoot leaf consists of the dried leaves of *Tussilago Farfara* Linn. (Fam. Compositæ).

The leaves, which appear much later than the flower stems, are cordate, petiolate, and from 10 to 25 centimetres wide. The margin is sinuate-dentate, each tooth terminating in a hard, brown point. The upper surface is greyish-green and wrinkled, the under surface being white with densely tomentose, loose, felted hairs. The leaves are without characteristic odour or taste.

The **microscopical** characters are the wavy-walled and striated epidermal cells; the 3 or 4 rows of palisade cells; the numerous stomata on both surfaces; the abundant, characteristic, slender, whip-like, uniseriate hairs, each composed of 3 to 6 short cells and a very narrow terminal cell which often attains a length of about 0·8 millimetre. The leaves **contain** mucilage, tannin and traces of a bitter glycoside.

Substitutes.—The leaves of butterbur, *Tussilago Petasites* Linn., may be distinguished by their more rounded outline, larger size and less sinuate margin.

Action and Uses.—Coltsfoot leaf is used as a demulcent to relieve chronic and irritable cough. A decoction (1 in 20) may be taken in doses of 2 fluid ounces, or more, several times daily.

ULMUS FULVA
(Ulm. Fulv.)
Slippery Elm

Slippery elm is the dried bark, deprived of the dark outer portion, of *Ulmus fulva* Michaux (Fam. Ulmaceæ), a small tree indigenous to the Central and Northern United States of America.

The bark occurs in large, flat strips, several decimetres in length but only about 3 millimetres thick, consisting of secondary phloem. The outer surface is reddish-brown with patches of the brown outer portion, and longitudinally striated; the inner surface is tawny yellow. The bark is very tough and fibrous. The smoothed, transverse section is minutely chequered, due to tangentially alternating layers of bast fibres and sieve tissue traversed by medullary rays, and, after moistening, exhibits numerous cells filled with transparent, swollen mucilage. The odour is strong, resembling fœnugreek, and the taste is very mucilaginous.

The diagnostic **microscopical** characters are the large mucilage cells scattered throughout the phloem and staining with ruthenium red; the groups of only slightly lignified, but strongly thickened, phloem fibres, surrounded by cells containing prisms of calcium oxalate; the numerous starch grains, usually 3 to 5 microns wide but sometimes up to 25 microns; the absence of stone cells and of cork.

Slippery elm **contains** mucilage; 10 grains of the powdered bark will convert one fluid ounce of cold water into a thick jelly. It also contains a little tannin.

Standard.—Slippery elm yields not more than 12 per cent. of ash. Acid-insoluble ash not more than 0·4 per cent.

Slippery elm, in powder (Pulvis Ulmi Fulvæ: Pulv. Ulm. Fulv.), contains the constituents and possesses the diagnostic microscopical characters of Ulmus Fulva, and complies with the standard for the unground drug.

Action and Uses.—Slippery elm is used in the form of decoction (1 in 8) as a demulcent in catarrhal affections and in diarrhœa and dysentery. It is sometimes mixed with hot water for use as a poultice for ulcers and whitlows. An enema prepared by adding boiling water to slippery elm (1 in 20) has been used for inflammation of the bowel.

URANII NITRAS
(Uran. Nit.)
Uranium Nitrate

$UO_2(NO_3)_2,6H_2O = 502·2$

Synonyms—Uranyl Nitrate; Uranic Nitrate.

Uranium nitrate may be prepared from pitch-blende by treating the finely powdered mineral with concentrated nitric acid and removing from the solution by appropriate treatment the various other metals

associated with it, such as barium, bismuth, lead, iron, zinc, radium and polonium. The purified solution finally obtained is evaporated and the salt crystallised. It occurs in the form of odourless, lemon-yellow, rhombic prisms, greenish-yellow by reflected light, superficially efflorescent in dry air and having radioactive properties. The solutions have a bitter, astringent, styptic taste, without any metallic after-taste. It melts in its water of crystallisation at 59·5°, and the liquid boils at 118°. On further heating it is decomposed, giving off nitric acid and leaving the reddish-yellow trioxide, UO_3, and, at a still higher temperature, the dark green oxide, U_3O_8. It is reduced to the uranous salt by hydrogen sulphide and by alcohol, ether and other organic matter in sunlight.

The radioactivity of uranium nitrate may be shown by placing a crystal on a material impervious to light, such as black paper or aluminium, and laying it on a photographic plate for a short time, when, after developing, the position and shape of the crystal will be recorded, or, if a crystal is held at a short distance from a charged electroscope this will lose its charge more quickly than it would normally. When the salt, however, is recrystallised from ether this property is lost, showing that the activity is due to some other substance ordinarily present. It should be stored in well-stoppered bottles and protected from light.

Readily **soluble** in water (about 2 in 1); soluble in alcohol and ether.

Standard.—Uranium nitrate contains not less than 98 per cent. of $UO_2(NO_3)_2,6H_2O$. 1 gramme complies with the limit test for sulphates. The aqueous solution (1 in 20) is not turbid, and remains clear on the addition of an equal volume of ammonium carbonate solution (limit of alkaline earths); on diluting this solution and saturating it with hydrogen sulphide, no darkening or precipitate is produced (limit of lead, iron, manganese and zinc). 1 gramme dissolved in 20 millilitres of water and acidified with dilute sulphuric acid does not completely decolourise 0·1 millilitre of N/10 potassium permanganate (limit of uranous compounds).

Assay.—Dissolve about 0·5 gramme, accurately weighed, in 100 millilitres of water, boil and add excess of solution of ammonia; wash the precipitate on a filter with 1 per cent. w/v ammonium nitrate solution, and ignite; 1 gramme of the residue, U_3O_8, is equivalent to 1·789 grammes of $UO_2(NO_3)_2,6H_2O$.

Action and Uses.—Solutions of uranium nitrate are poisonous and produce glycosuria when injected subcutaneously, even in small doses. They should be used with the greatest caution since they very easily cause nephritis. The action of uranium salts in producing glycosuria is attributed to increased permeability of the renal cells to sugar, since there is no increase of sugar in the blood. They have been employed internally in diabetes and cancer, but there is little or no ground for attributing to them any beneficial action in these diseases. Uranium nitrate is best administered in dilute solution in mixture form.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

URANII ACETAS.—Uranium acetate, $UO_2(CH_3CO_2)_2,2H_2O$, occurs in the form of yellow, transparent, rhombic crystals. It is used as a reagent to detect peroxides; on the addition of hydrogen peroxide and then potassium carbonate, a red colour is produced; on adding two or three times its volume of alcohol, a heavy red precipitate is obtained. Zinc uranyl acetate is used as a reagent for the quantitative determination of sodium.

UREA
(Urea)
Urea

$CH_4ON_2 = 60{\cdot}05$

Synonym—Carbamide.

Urea, $CO(NH_2)_2$, is the diamide of carbonic acid, and may be obtained by the direct condensation of ammonia and carbon dioxide under pressure. It is present in urine to the extent of about 2·5 to 3 per cent. Urea occurs in the form of colourless, transparent, prismatic crystals which are somewhat hygroscopic, almost odourless and have a cooling, saline taste. It combines with acids to form mono-acid salts, of which the best known are the nitrate, CH_4ON_2,HNO_3, and oxalate, $(CH_4ON_2)_2,H_2C_2O_4$. The former is precipitated on adding excess of nitric acid to an aqueous solution of urea; it is soluble in water but insoluble in nitric acid. The oxalate is sparingly soluble in water. Both salts crystallise in characteristic forms.

When heated above the melting-point urea is decomposed; at 150° ammonia is evolved and biuret, $NH(CONH_2)_2$, remains, which can be identified by dissolving the product in water, making the solution alkaline with sodium hydroxide solution and adding one drop of copper sulphate solution, when a reddish-violet colour is produced. At higher temperatures biuret is decomposed into ammonia and cyanuric acid. When urea is heated with water under pressure, ammonium carbonate is formed.

Soluble in water (1 in 1), alcohol (90 per cent.) (1 in 5) and boiling alcohol (90 per cent.) (1 in 1); insoluble in ether and chloroform.

Standard, B.P.—Urea has a melting-point of 130° to 132°. Ash, not more than 0·1 per cent.

Action and Uses.—Urea is non-toxic and exerts a diuretic action which probably depends upon its power to increase the proportion of units functioning in the kidney. The renal threshold for urea is low; excretion is rapid and is accompanied by an increase in the output of urine. The ability to excrete urea is markedly impaired when renal damage has occurred, as in chronic interstitial nephritis. Urea is formed in the liver from ammonium salts. The impairment of the power of the diseased kidney to concentrate urea is extensively used as a test of renal function.

The urea concentration test consists in the administration of 15 grammes of urea dissolved in 100 millilitres of water. The draught is given fasting and after the bladder has been emptied. Determinations

of the urea content of the urine are made one, two and three hours after the dose. At one of these periods the urea content should exceed 2 per cent. A figure below this indicates renal inadequacy unless there is excessive diuresis. The normal urea content of the blood is from 20 to 40 milligrams per 100 millilitres. A figure of 100 milligrams or over indicates uræmia. Urea may be administered by the mouth, or by subcutaneous or intravenous injection. For intravenous administration it should be dissolved in normal saline solution.

Dose.– 1 to 16 grammes (¼ to 4 drachms).

ACIDUM URICUM.—Uric acid, $C_5H_4O_3N_4$, is 2 : 6 : 8-trioxypurine, and may be obtained from guano or from serpents' excrement. It occurs in white, odourless and tasteless crystals which are decomposed without melting when heated. When a small quantity is mixed with nitric acid and the mixture evaporated to dryness, a yellow residue is left, which changes to violet on the addition of ammonia (murexide test). It is slightly soluble in water, soluble in concentrated sulphuric acid and reprecipitated on dilution with water, and insoluble in alcohol and ether. Uric acid is the chief end-product of purine metabolism in man. The proportion of uric acid in the blood is increased in gout and in advanced chronic interstitial nephritis. Uric acid is non-toxic. It is not used therapeutically.

URETHANUM

(Urethan.)

Urethane

$C_3H_7O_2N = 89{\cdot}06$

Synonym—Ethyl Carbamate.

Urethane, $CO(NH_2)OC_2H_5$, may be prepared by the action of ammonia upon ethylchloroformate. It occurs in the form of colourless, odourless, prismatic crystals or scales, having a cooling, saline, slightly bitter taste. Its solutions are neutral. Boiling-point, about 180°, subliming without decomposition. It burns with a slightly luminous, bluish flame. When boiled with potassium hydroxide solution, it yields potassium carbonate, alcohol and ammonia. Heated with ammonia, it gives alcohol and urea. On gently heating with five times its weight of sulphuric acid, carbon dioxide is evolved, alcohol and ammonium acid sulphate being formed at the same time. When a solution of 0·5 gramme in 5 millilitres of water is warmed with 1 gramme of sodium carbonate and 0·01 gramme of iodine, crystalline scales of iodoform separate on cooling.

Soluble in water (1 in 2), alcohol (1 in 1), ether, chloroform, glycerin and oils.

Standard.—Urethane melts between 47·5° and 50°. Ash, not more than 0·05 per cent. 1 gramme complies with the limit test for chlorides.

Action and Uses.—Urethane is a safe hypnotic and is particularly useful for administration to children, since it produces light sleep without after-effects and has no depressant action on the heart. It is, however, too weak and inconstant in its action to be successfully employed in the

treatment of insomnia in adults. Urethane is antagonistic to strychnine and in cases of poisoning by this drug, or in tetanus, it may be administered in large doses until the convulsions are controlled. It is oxidised in the body to urea and, therefore, acts as a diuretic. It is used with quinine hydrochloride in Injectio Quininæ et Urethani for the injection treatment of varicose veins. Preparations of urethane and quinine for **injection** may be sterilised by heating in an autoclave at 110° for twenty minutes, by tyndallisation, by filtration, or by heating at 100° for thirty minutes.

Dose.– 1 to 2 grammes (¼ to ½ drachm).

Preparation

Injectio Quininæ et Urethani, B.P.C.—(Inj. Quinin. et Urethan.)—Injection of Quinine and Urethane. A sterile aqueous solution containing quinine hydrochloride, about 13·5 per cent. w/v, and urethane, about 6·5 per cent. w/v. Dose.–5 millilitres (75 minims), by intravenous injection.

URGINEA
(Urgin.)

Urginea

Synonym—Indian Squill.

Urginea consists of the sliced younger bulbs of *Urginea indica* Kunth. (Fam. Liliaceæ), a plant indigenous to India. The bulbs are collected soon after the plant has flowered, divested of their dry, outer, membranous coats, cut into slices and dried. Urginea should be stored in a cool place and the powdered drug should be kept over quicklime.

The drug occurs in curved or irregularly shaped strips. They are ridged in the direction of their length and vary in colour from pale yellowish-brown to buff. When dry they are brittle, but in the presence of moisture they become tough and flexible. The drug is without odour, but has a bitter taste. Urginea **contains** bitter principles similar to the glycosidal substances found in European squill.

Action and Uses.—Urginea is used in India and the Eastern Colonies in place of squill. Vinegar (Acetum Urgineæ), oxymel (Oxymel Urgineæ), pill (Pilula Urgineæ Composita), syrup (Syrupus Urgineæ) and tincture (Tinctura Urgineæ), may be prepared and administered in the same way as the corresponding preparations of squill.

UVA URSI
(Uva Ursi)

Bearberry

Synonyms—Uvæ Ursi Folia; Bearberry Leaves.

Bearberry consists of the dried leaves of *Arctostaphylos Uva-ursi* Spreng. (Fam. Ericaceæ), a small, procumbent, evergreen shrub

growing on rather dry, heathy or rocky hills and widely distributed over the greater part of the Northern Hemisphere.

The leaves are dark green or brownish-green in colour, obovate or spathulate, entire, very shortly petiolate, and up to about 3 centimetres in length; they are brittle, coriaceous, and glabrous except near the base and on the petiole. The upper surface is tessellated by sunken veinlets. They are odourless, and the taste is astringent and somewhat bitter.

The diagnostic **microscopical** characters are the epidermis of straight-walled, polygonal cells; the stomata, on the lower surface only, up to 50 microns long and surrounded by 4 to 7 cells; the irregular, prismatic crystals of calcium oxalate enclosed in the cortical collenchyma; the palisade, 3 to 5 rows deep; the small oil drops in most of the cells.

Bearberry **contains** tannin (6 to 7 per cent.), gallic acid, ellagic acid, arbutin, methylarbutin, ursone, quercetin, and probably also myricetin. Arbutin, $C_{12}H_{16}O_7,\frac{1}{2}H_2O$, melting-point about 168°, is a crystalline glycoside yielding on hydrolysis dextrose and hydroquinone. Ursone, $C_{38}H_{48}O_3,2H_2O$, crystallises in colourless, tasteless, odourless needles melting at about 265°.

Substitutes.—The leaves of the box, *Buxus sempervirens* Linn. (Fam. Euphorbiaceæ), and of the cowberry, *Vaccinium Vitis-Idea* Linn. (Fam. Ericaceæ), have been mistaken for bearberry leaves. Box leaves are distinguished by the emarginate apex and easily-separable epidermis, and cowberry leaves by the scattered brown spots on the under surface.

Standard.—Bearberry contains not more than 5 per cent. of foreign organic matter.

Bearberry, in powder (Pulvis Uvæ Ursi: Pulv. Uvæ Ursi), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Bearberry is diuretic and astringent. Its diuretic action is due to the glycoside, arbutin, which is largely absorbed unchanged and is excreted by the kidneys. A proportion of arbutin is, however, hydrolysed, with formation of hydroquinone; this is also excreted in the urine, to which it gives a greenish-brown colour, darkening on standing owing to oxidation. During its excretion, arbutin exercises an antiseptic effect on the mucous membrane of the urinary tract. Bearberry is, therefore, used in inflammatory diseases such as urethritis, cystitis, etc. It is usually **administered** in the form of infusion, with other diuretics and urinary antiseptics.

Preparations

Infusum Uvæ Ursi Concentratum, B.P.C.—(Inf. Uvæ Ursi Conc.)—Concentrated Infusion of Bearberry. 1 in 2½. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of bearberry, and differs also in containing a small proportion of alcohol. Dose.—2 to 4 millilitres (½ to 1 fluid drachm).

Infusum Uvæ Ursi Recens, B.P.C.—(Inf. Uvæ Ursi Rec.)—Fresh Infusion of Bearberry. 1 in 20. When infusion of bearberry or Infusum Uvæ Ursi is prescribed, fresh infusion not being specified, either Infusum Uvæ Ursi Recens or Infusum Uvæ Ursi Concentratum suitably diluted may be dispensed. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

This infusion was included in the British Pharmacopœia, **1914,** *under the name of Infusum Uvæ Ursi.*

VACCINUM BUBONICUM

(Vaccin. Bubonic.)

Anti-plague Vaccine

Anti-plague vaccine is a suspension of a killed culture of *Pasteurella pestis* and contains 0·5 per cent. of phenol as a preservative. The cultures may be grown on solid media at 37°; at this temperature the bacillus develops an envelope which contains an antigen quite distinct from that in the body of the bacillus. The bacilli are then suspended in physiological solution of sodium chloride and killed by heating at 60°, and the suspension is diluted so that the required dose is contained in a convenient volume. Such vaccines are more potent and less toxic than those grown at 26°. It is issued in containers sealed so as to exclude bacteria and should be **stored** in a cool place. The label on the container states the number of organisms per millilitre and the date after which the preparation is not intended to be used.

Standard.—Anti-plague vaccine complies with the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Anti-plague vaccine is used as a prophylactic against plague. The usual dose for adults is 1000 million organisms, followed in ten days time by 2000 million, or two doses of 1500 million organisms are given at the same interval. The injection of this vaccine may sometimes give rise to local swelling and redness, and to enlargement of the lymphatic glands. There may also be headache, pyrexia and general malaise. These symptoms usually subside after twenty-four to forty-eight hours. Persons exposed to infection should be inoculated every six months.

HAFFKINE'S PLAGUE PROPHYLACTIC, which is largely used in India, is prepared as follows:—A strain of *P. pestis* is isolated by blood culture from a human case of plague with septicæmia, and maintained in continuous passage in susceptible rats without intermediate culture on artificial media. The strain should be of such a virulence that a dose of 5 to 10 organisms should prove fatal to a white mouse. In order to obtain a pure colony of *P. pestis*, sub-cultures are made on rabbit blood agar which is seeded into acid digest broth (prepared by digesting lean goat flesh in hydrochloric acid for three days and neutralising with sodium hydroxide), standardised to contain 230 milligrams of nitrogen per 100 millilitres and adjusted to *p*H 6·8. After four days at room temperature, the cultures are incubated for four weeks at 27°. The cultures are then tested for freedom from other organisms and sterilised by heating at 55° for fifteen minutes, 5 grammes of phenol being added to each litre of culture. The vaccine is not standardised, the regularity of the process of manufacture being depended upon for the production of a vaccine of uniform composition. The dose of Haffkine's plague prophylactic is 4 millilitres for adults, unless it is used within three months of the date of manufacture, when the dose is 3 millilitres only.

VACCINUM GONOCOCCICUM
(Vaccin. Gonococcic.)
Gonococcus Vaccine

Gonococcus vaccine is a sterile suspension of numerous strains of *Gonococcus*, prepared from freshly isolated cultures of the organisms. The cultures are separated and suspended in physiological sodium chloride solution, killed by heating at 55° for one hour and, after enumeration, diluted with physiological sodium chloride solution to a degree suitable for the required dosage. It contains 0·5 per cent. of phenol or other equivalent antiseptic, and should be **stored** in sterilised containers sealed so as to exclude bacteria, and should not be used later than three years after the date of its preparation.

Standard.—Gonococcus vaccine complies with the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Gonococcus vaccine is used in the treatment of gonorrhœa. In the acute stage the vaccine is useful only if the patient is subjected to a strict routine of diet and rest, and then only in small doses of 2 to 5 million. Small doses are used also in gonococcal arthritis, vulvo-vaginitis of children and gonococcal iritis and ophthalmia. In the treatment of chronic gonorrhœa and gleet larger doses of 100 to 500 million may be given, but as in these conditions there are usually large numbers of streptococci, staphylococci and diphtheroid bacilli present in the discharge, it is often advantageous to use a compound vaccine containing these organisms in addition to the gonococcus. In the treatment of gonorrhœal infections an autogenous vaccine is preferable to a stock vaccine. A dose of gonococcus vaccine equivalent to 500 million organisms may be given as a provocative test dose to indicate whether the patient has been cured; if gonococcal infection persists there is usually a transient discharge in which gonococci may be found.

Dose.– 2 million to 500 million organisms, by subcutaneous injection.

VACCINUM PERTUSSIS
(Vaccin. Pertuss.)
Pertussis Vaccine

Synonym—Whooping Cough Vaccine.

Pertussis vaccine is a sterile suspension of *Bacillus pertussis* (*Hæmophilus pertussis*) made from freshly isolated cultures or from cultures preserved in such a way as to retain their antigenic powers. The killed organisms, suspended in physiological sodium chloride solution, are, after enumeration, diluted with physiological sodium chloride solution to a degree suitable for the required dosage. It contains 0·5 per cent. of phenol or other equivalent antiseptic, and should be **stored** in sterilised containers sealed so as to exclude bacteria, and

should not be used later than three years after the date of its preparation. It is important to make the vaccine as soon as possible after the isolation of the cultures. Old stock cultures are unsuitable since in these the antigenic characters of the bacillus are usually altered. Fresh blood agar is a suitable medium on which to grow the cultures in order to maintain maximum antigenic activity.

Standard.—Pertussis vaccine complies with the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Pertussis vaccine is used for the prevention and treatment of whooping cough. The reported results of the value of the vaccine are conflicting and it appears that failures in the past have been due to the use of vaccine prepared from old stock cultures which have lost their immunising properties. Inoculation with a vaccine made from a freshly isolated culture of *B. pertussis* confers some immunity against an attack of whooping cough; when an inoculated person contracts the disease the severity of the attack is diminished. Inoculation of contacts with the vaccine is useful for controlling the spread of an epidemic. In the treatment of whooping cough, there is a certain amount of evidence to indicate that the use of vaccine in the early stages of infection shortens the attack. Since the *Bacillus influenzæ* and the *Pneumococcus* are frequent secondary invaders, a mixed vaccine containing these organisms as well as the *B. pertussis* is often used for either prophylaxis or treatment. When pertussis vaccine is used as a prophylactic, a child between one and two years of age may receive 800 million, 1600 million and 3200 million organisms at intervals of three or four days; older or younger children should receive doses in proportion to age. For therapeutic purposes, treatment may be commenced with a dose of 250 million, gradually increased. Pertussis vaccine gives little reaction and doses of up to 4000 or even 5000 million organisms can be given safely to children.

VACCINUM PNEUMOCOCCICUM

(Vaccin. Pneumococcic.)

Pneumococcus Vaccine

Pneumococcus vaccine is a suspension of killed pneumococci isolated from pneumococcal infections in man. The genus *Pneumococcus* exhibits three serological groups—types I, II and III; and a heterogeneous group, comprising all those which do not conform to any of the other three types, is termed type IV. The vaccine is prepared by growing the organisms on a suitable culture medium at 37° and, when satisfactory growth is obtained, washing off the culture, suspending it in physiological saline solution and enumerating by a suitable method. The organisms are killed by heating at 57° for one or two hours. The suspension is diluted to contain the required number of organisms in a volume suitable for dosage, and a preservative equivalent to 0·5 per

cent. of phenol is added. Stock pneumococcus vaccine is usually prepared from a mixture of all four types of the pneumococcus, but when the infecting type can be determined a monotypical autogenous vaccine may be used in preference to a stock vaccine. It should be **stored** in sterilised containers sealed so as to exclude bacteria and should not be used later than three years after the date of its preparation.

Standard.—Pneumococcus vaccine complies with the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Pneumococcus vaccine is employed in chronic and subacute localised infections due to the pneumococcus, such as empyema, arthritis, sinusitis, abscesses, etc. It is also used in the treatment of acute pneumococcal lobar pneumonia or broncho-pneumonia; it is said that an attack can be aborted if the vaccine is given in the incubation stage. The vaccine may be given as a prophylactic to protect susceptible persons who are exposed to pneumococcal infections. Pneumococcus vaccine has also been used with varying success in the treatment of chronic bronchial and nasal catarrh due to this organism. Frequently other organisms are present in these conditions, giving rise to mixed infections. These ancillary organisms are chiefly *B. influenzæ*, staphylococci, streptococci and gram-negative cocci of the catarrhalis group. In these mixed infections mixed vaccines should be employed. The dose of pneumococcus vaccine in chronic infections is from 25 to 50 million organisms injected subcutaneously, followed, at intervals of five to seven days, by increasing doses up to a maximum of 2000 million. The aim of dosage is to build up a rapid immunity without causing focal reactions. For prophylaxis, doses of 500, 1000 and 2000 million may be given at intervals of seven days. In acute lobar pneumonia, the dose should not exceed 5 million and may be doubled after twenty-four hours.

INFLUENZA VACCINE.—Vaccines prepared from bacteria associated with influenza are used for the prevention and treatment of epidemic influenza. The common bacteria associated with severe influenza are the *B. influenzæ*, pneumococci, and streptococci, and these are usually incorporated in one vaccine. It is important to use as many different, freshly isolated strains of *B. influenzæ* as possible in the preparation of the vaccine. It is improbable that the immunity from such a vaccine persists longer than three months. There is strong evidence to indicate that the primary infection in influenza is a filter-passing virus, and that the *B. influenzæ* and other bacteria are merely secondary factors. Influenza vaccine may be administered in doses of 500 or 1000 million of the organism, *B. influenzæ*, together with 1000 million pneumococci and 100 million streptococci.

VACCINUM STAPHYLOCOCCICUM

(Vaccin. Staphylococcic.)

Staphylococcus Vaccine

Staphylococcus vaccine is a sterile suspension of killed staphylococci. The genus *Staphylococcus* comprises two main chromogenic

types, the white and the golden-yellow staphylococcus, respectively known as *Staphylococcus albus* and *Staphylococcus aureus*. As a general rule, the aureus strains are the more virulent and they are more commonly encountered in human lesions. Staphylococcus vaccine contains both chromogenic types, but *S. aureus* predominates. It is prepared by growing the organisms on a suitable culture medium for twenty-four hours, after which they are suspended in physiological sodium chloride solution containing 0·5 per cent. of phenol and killed by heating at 65°. The number of organisms in the suspension is estimated by an appropriate method and the suspension diluted, to a degree convenient for the required dosage, with physiological sodium chloride solution containing 0·5 per cent. of phenol. It is issued in containers sealed so as to exclude bacteria and should be **stored** between 0° and 15°. The label on the container indicates the number of organisms per millilitre.

Standard.—Staphylococcus vaccine complies with the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Staphylococcus vaccine is of proved value in the treatment of staphylococcal infections of the skin, such as pustular acne, sycosis, impetigo, furunculosis and carbuncles. It is also of value in the treatment of osteomyelitis, as an adjunct to operative measures, and for the prophylaxis of infection after wounds or surgical operations. When the vaccine is used for the treatment of staphylococcal infections in an adult, the first dose should be 25 to 100 million injected subcutaneously, increasing the dosage by regular increments, at intervals of five to seven days, up to a maximum dose of 1000 to 2000 million organisms. In very severe infections, such as osteomyelitis, doses of 5 million organisms may be repeated at intervals of twenty-four hours. For children, the doses for treatment should be from one-quarter to one-sixth of the adult dose, depending upon the age and clinical condition of the child. The prophylactic doses for both adults and children are 500 and 1000 million at an interval of a week.

Dose.– 5 to 2000 million organisms, by subcutaneous injection.

ACNE BACILLUS VACCINE is a suspension of killed acne bacilli in sterile normal saline solution containing 0·5 per cent. of phenol. It is used in the treatment of acne vulgaris, often in association with staphylococcus vaccine. Usually a prolonged course of treatment is necessary before much improvement is evident. The initial dose of acne bacillus vaccine is 5 million organisms, gradually increased. In some cases, doses from 100 million to 2000 million may be necessary. In cases of pustular acne, staphylococcus vaccine in doses of from 200 million to 2000 million may be given in addition to acne bacillus vaccine.

ANTITOXINUM STAPHYLOCOCCICUM.— Staphylococcus antitoxin is prepared from the serum of horses which have been immunised by repeated injections of the specific toxin of the *Staphylococcus*. The potency of the antitoxin can be determined against the specific toxin by means of a skin test on rabbits. The antitoxin complies with the regulations made under the Therapeutic Substances Act, 1925. It is used in the treatment of furunculosis, staphylococcal septicæmia and acute osteomyelitis.

BACILLUS COLI VACCINE is used in the treatment of *B. coli* infections of the genito-urinary tract. The dose ranges from 5 million, increased at weekly intervals to 500 million. The vaccine is sometimes administered to patients suffering from *B. coli* infection of the urinary tract to immunise them preparatory to a major operation on that region. Three doses should be given, 100, 500 and 1000 million at weekly intervals.

VACCINUM STREPTOCOCCICUM.—Streptococcus vaccine is a suspension of killed cultures of various strains of *Streptococcus*, and is prepared by methods similar to those used for other vaccines. The streptococci are a large group of organisms associated with a great variety of infections, and the selection of strains of the organism for the preparation of the vaccine depends upon the condition it is desired to treat. No entirely satisfactory system of classification of the streptococci has yet been evolved; they may be broadly grouped by their action when grown on blood agar into *Streptococcus hæmolyticus*, which in its growth dissolves red blood cells, *Streptococcus viridans*, which changes hæmoglobin into methæmoglobin, thus changing the red colour of blood to green, and an indifferent group which has no action on blood. They may also be classified roughly according to the region of the body which they usually inhabit or by their pathogenic action. For the treatment of chronic rheumatic conditions a vaccine composed of numerous strains of streptococci isolated from the mouth, intestines and genito-urinary tract of patients suffering from rheumatism is employed. It is most useful in the non-arthritic types of rheumatism. The dose may range from an initial dose of $\frac{1}{2}$ to 1 million streptococci up to 500 or 1000 million streptococci. In acute rheumatic conditions the vaccine is sometimes injected intravenously in doses of 1 million, gradually increased up to 100 million.

Other conditions for which streptococcus vaccine is employed are cellulitis, septic burns and septic wounds (often in conjunction with staphylococcus vaccine), mouth infections such as pyorrhœa alveolaris, and streptococcal infections of the intestinal tract. In acute streptococcal infections, such as scarlet fever, puerperal septicæmia and erysipelas, streptococcus antitoxin (scarlatina) is more generally used.

VACCINUM TUBERCULINUM

(Vaccin. Tuberculin.)

Tubercle Vaccine

Tubercle vaccine is prepared by the prolonged grinding in a ball mill of living tubercle bacilli grown on a solid medium. The grinding, which may occupy several months, is continued until all the bacilli are dead and have lost their acid-fast properties. The material is then emulsified in normal saline solution and so diluted that the number of milligrams of solid material is convenient for human dosage. It is now often prepared by grinding heat-killed tubercle bacilli in the same way. Tubercle vaccine appears to contain the same active principle as old tuberculin but, as tested by animal methods, its potency is usually not more than one-tenth to one-twentieth that of the standard preparation of old tuberculin. It is issued in containers sealed so as to exclude bacteria, and should be **stored** between 0° and 15°. The label on the container indicates the weight in milligrams of powdered tubercle bacilli per millilitre.

Standard.—Tubercle vaccine complies with the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Tubercle vaccine is used in the treatment of localised tuberculous infections, for example, tuberculous glands, tuberculosis of the bones and joints, tuberculous cystitis and lupus. Caution should be observed in its use, particularly in the treatment of pulmonary tuberculosis. Owing to the great variation in the sensitivity of patients, no exact system of dosage can be laid down. It is advisable to commence treatment with the subcutaneous injection of not more than the equivalent of $\frac{1}{800.000}$ to $\frac{1}{100.000}$ milligram of dried substance, increasing the dose cautiously at five to seven day intervals if well tolerated. Tubercle vaccine is not suitable for diagnostic purposes.

TUBERCULINUM NOVUM.—Under the name "new tuberculin" are grouped a number of preparations which are prepared by methods which aim at releasing the endocellular material of tubercle bacilli. Thus, while old tuberculin is a filtrate of a fluid medium upon which *Bacillus tuberculosis* has grown, new tuberculin consists of preparations made from the disintegrated bodies of the bacilli. Tubercle vaccine, also called tuberculin bacillary emulsion (T.B.E.) is the preparation to which the name "new tuberculin" was originally applied by Koch. Other preparations of a similar nature are designated under the names T.R. (German-Tuberkulin-Ruckstand) and P.B.E. (German-Perlsuchtbazillenemulsion). These preparations were introduced for the treatment of tuberculosis, but in spite of long experience in their use there is little evidence that they have any therapeutic or prophylactic value, and they are unsuitable for diagnostic use.

VACCINUM TYPHO-PARATYPHOSUM

(Vaccin. Typho-paratyphos.)

Anti-typhoid-paratyphoid Vaccine

Synonym—T. A. B. Vaccine.

Anti-typhoid-paratyphoid vaccine is a sterile suspension of killed organisms, *Bacillus typhosus*, *B. paratyphosus A* and *B. paratyphosus B*. It is prepared from pure cultures of each of the three organisms, which are grown separately for twenty-four hours on solid media, and then suspended in physiological solution of sodium chloride. The suspensions are heated at 55° for one hour to kill the organisms, enumerated by a suitable method, and mixed in such proportions as to produce a suspension containing the required number of organisms per millilitre. It contains 0·5 per cent. of phenol or other equally effective antiseptic. It should be **stored** between 0° and 15° in sterilised containers sealed so as to exclude bacteria, and should not be used later than eighteen months after the date of its preparation.

Standard, B.P.—Each millilitre of anti-typhoid-paratyphoid vaccine contains 1000 million *B. typhosus*, 500 million *B. paratyphosus A*, and 500 million *B. paratyphosus B*. It complies with the tests for sterility prescribed in the regulations made under the Therapeutic Substances Act, 1925.

Action and Uses.—Anti-typhoid-paratyphoid vaccine is used for the prevention of typhoid and paratyphoid fevers. Persons should be inoculated before proceeding to a country where typhoid is endemic, and not during an epidemic. The duration of immunity is probably not more than two years and may be even less.

Dilutions of anti-typhoid-paratyphoid vaccine have been used for intravenous injection to provoke general systemic reactions in the treatment of disseminated sclerosis, rheumatoid arthritis, general paralysis, tertiary syphilis and certain eye diseases, such as severe, acute and sub-acute infections of the conjunctiva, ulcers of the cornea and keratitis. For this purpose the initial dose should be from 25 to 100 million organisms, diluted to 5 millilitres with normal saline solution. Subsequently the dose is increased at intervals of four or five days to a maximum of 500 million or more.

Dose.– Prophylactic, 0·5 millilitre (first dose) to 1 millilitre (second dose after seven to ten days), by subcutaneous injection.

VACCINUM CHOLERÆ.—Cholera vaccine is prepared from twenty-four-hour cultures of the *Vibrio choleræ*, which are killed by heating at 56° and suspended in normal saline solution containing 0·5 per cent. of phenol. It is used for prophylactic inoculation against cholera, often together with anti-typhoid-paratyphoid vaccine as a compound vaccine (T.A.B.C. Vaccine). Dose.– 1000 million organisms, followed after seven or ten days by 2000 million.

VACCINUM VACCINIÆ
(Vaccin. Vacciniæ)

Vaccine Lymph

Synonym—Vaccinum Antivariolum.

Vaccine lymph is a preparation of the substance obtained from the vesicles produced on the skin of healthy animals, usually calves, by the cutaneous inoculation of vaccinia virus. Calves which appear to be healthy and from three to six months old, are kept under observation for approximately one week in specially constructed premises so arranged that they can be kept scrupulously clean. The animals are thoroughly cleaned and groomed, and their temperatures systematically taken and recorded; any sick or doubtful animal is at once rejected.

The skin over the abdomen and flanks is shaved and washed thoroughly with soap and hot water, then with sterilised water and dried with sterilised swabs. Light incisions are made in the cleansed skin without, as far as possible, drawing blood, and on them stock vaccine lymph of ensured potency is implanted. The calves are then removed to other premises and carefully watched. Five days later, if the vesicular development is good, the site of vaccination is washed and dried as before, and the contents of the vesicles (the pulp) are removed, under aseptic conditions, by means of a Volkmann's spoon. The pulp from each animal is collected separately and the containers labelled. The animals are then removed from the premises, slaughtered,

and the carcases examined by a veterinary surgeon. Unless the animal is certified to be completely free from disease, the pulp from it is forthwith destroyed. The pulp or crude lymph is weighed, and after thorough grinding is mixed with four times its weight of 50 per cent. glycerin in distilled water, or some other partial disinfectant. It is then maintained at temperatures below 0° until, by the action of the disinfectant and of the low temperature, the number of living bacteria and other organisms is reduced to the required limit.

Vaccine lymph occurs as a viscid, colourless liquid, containing white particles in suspension. It should be **stored** in sterilised glass containers sealed so as to exclude bacteria. Each container holds one dose, or in an emergency a container holding several doses may be used. Its potency is retained for long periods when stored below 0°. At temperatures from 0° to 5°, the potency is usually retained for three months; at temperatures from 5° to 10°, it is retained for four weeks. When stored above 10°, the potency may be lost after seven days.

Standard, B.P.—Vaccine lymph contains not more than 5000 living bacteria or other organisms per millilitre It complies with the test for absence of living, gas-producing, anaerobic organisms, and with the test for absence of hæmolytic streptococci, as described in the regulations made under the Therapeutic Substances Act, 1925. A 1 in 1000 dilution in physiological solution of sodium chloride produces the characteristic lesions of vaccinia virus when applied to a scarified area of the shaved skin of a rabbit or guinea-pig.

Action and Uses.—Cutaneous inoculation with vaccine lymph results in the production at the site of inoculation of the characteristic eruption of vaccinia. Protective substances are formed by the body as a result of this infection against both vaccinia and variola, and this immunity persists for a considerable number of years. Primary vaccination should be performed in infancy between the ages of two months and six months, and re-vaccination between the ages of six and seven years and again at fourteen to sixteen years. It is advised that only one scarification should be made, with a minimum of trauma.

Post-vaccinal encephalitis, an acute nervous disease with a high mortality rate, occasionally occurs after vaccination. It is associated with characteristic changes in the brain and cord, similar to those found in the acute nervous conditions occasionally following influenza, measles and variola, and has occurred mainly in children of school age, or adolescents who had not previously been vaccinated; it is extremely rare after re-vaccination and after primary vaccination in early infancy. It appears to be established that it is the vaccinia virus which initiates the nervous disturbance, but it is not known why this disturbance should be almost limited to a few individuals only of a particular age group. For the treatment of post-vaccinal encephalitis the serum of a recently successfully vaccinated subject should be given intrathecally in doses of 20 to 30 millilitres daily.

Dose.—0·06 millilitre (1 minim), by scarification.

VALERIANA
(Valerian.)
Valerian

Synonyms—Valerianæ Rhizoma; Valerian Rhizome; Valerian Root.

Valerian consists of the rhizome and roots of *Valeriana officinalis* Linn. (Fam. Valerianaceæ) collected in the autumn and slowly dried, during which process the characteristic odour develops. In England the drug is obtained from both wild and cultivated plants, of which there are two varieties, var. *Mikanii* Syme being distinguished from var. *sambucifolia* Mikan by the larger average number of leaflets per leaf and by the small number or absence of serrations on the anterior margins of the majority of the leaflets as compared with the posterior margins. *V. officinalis* var. *Mikanii* is found naturally on dry, calcareous heaths and pastures, and constitutes the much esteemed Derbyshire valerian. The drug is also imported largely from Holland and Belgium.

The rhizome is erect about 2 to 5 centimetres long and 1 to 2 centimetres thick, obconical to cylindrical in shape, dull yellowish-brown to dark brown in colour externally and whitish internally. It is entire or irregularly divided obliquely or longitudinally. The fracture is short and horny, showing internally a pale brown, thin cortex, a darker cambium line, a ring of inconspicuous vascular bundles and a large pith. Short stolons may be present, their internodes being about 3 centimetres long, about 2 to 2·5 millimetres in diameter, and longitudinally striated. The numerous roots are about 2 millimetres thick and 2 to 10 or more centimetres long, greyish-brown or brownish-yellow, cylindrical, finely striated longitudinally, brittle, with a broad cortex and a narrow stele. The drug possesses a strong characteristic odour, and the taste is aromatic, somewhat pungent and more or less bitter.

The diagnostic **microscopical** characters are, in the rhizome, the groups of large sclerenchymatous cells, with thick pitted walls, scattered in the large parenchymatous pith; an irregular ring of vascular bundles connected with a cambium and possessing varying amounts of secondary tissues according to age; an endodermis broken by the passing out of the adventitious roots and containing volatile oil; a cortex of parenchyma with slightly thickened, cellulose walls and packed with 2- to 4- compound starch grains, each component with a central hilum, and up to about 20 microns in diameter; a slight periderm: in the root, a more or less collapsed piliferous layer, somewhat papillose in appearance; an exodermis of irregular cells with thin suberised walls and containing volatile oil; cortical parenchyma as in the rhizome; a tetrarch or pentarch primary xylem; a slight pith. The stolons are similar to the rhizome, but show a well-defined ring of vascular bundles in which secondary thickening has taken place, and a prominent endodermis.

Valerian **contains** about 1 per cent: of volatile oil, consisting of bornyl *iso*valerate, formate, butyrate and acetate, associated with

l-pinene, *l*-camphene and *l*-limonene. Free *iso*valeric acid is gradually liberated during the drying of the drug. It yields to alcohol (60 per cent.) about 20 to 28 per cent. of extractive.

Standard, B.P.—Valerian contains not more than 5 per cent. of foreign organic matter. Ash, not more than 10 per cent.

Valerian, in powder (Pulvis Valerianæ : Pulv. Valerian.), contains the constituents and possesses the diagnostic microscopical characters of Valeriana, and complies with the limit for ash of the unground drug.

Action and Uses.—Valerian is a depressant, its action being attributed alternatively to the valerianic esters of the volatile oil and to its unpleasant odour and taste. It is used as an antispasmodic in hysteria and similar nervous manifestations, and as a carminative. It is **administered** as extract, infusion, or tincture, often in association with the alkali bromides.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Elixir Valerianæ, B.P.C.—(Elix. Valerian.)—Elixir of Valerian. Simple tincture of valerian, about 1 in 3, with liquid extract of liquorice and aromatic elixir. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Elixir Valerianæ Compositum, B.P.C.—(Elix. Valerian. Co.)—Compound Elixir of Valerian. *Syn.*—Elixir Bromidi et Valerianæ Compositum; Compound Elixir of Bromide and Valerian. 1 fluid ounce contains 7½ grains each of potassium bromide and chloral hydrate, and 15 minims of liquid extract of valerian, with oils of orange, lemon, coriander and anise, alcohol (95 per cent.), syrup and distilled water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Extractum Valerianæ, B.P.C.—(Ext. Valerian.)—Extract of Valerian. A firm extract. Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

Extractum Valerianæ Liquidum, B.P.C.—(Ext. Valerian. Liq.)—Liquid Extract of Valerian. 1 in 1, prepared from freshly dried valerian. Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Infusum Valerianæ Concentratum, B.P.C.—(Inf. Valerian. Conc.)—Concentrated Infusion of Valerian. 1 in 5. This concentrated infusion when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength, but not in flavour, to fresh infusion of valerian, and differs also in containing a small proportion of alcohol. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Infusum Valerianæ Recens, B.P.C.—(Inf. Valerian. Rec.)—Fresh Infusion of Valerian. 1 in 40. When infusion of valerian or Infusum Valerianæ is prescribed, fresh infusion not being specified, either Infusum Valerianæ Recens or Infusum Valerianæ Concentratum suitably diluted may be dispensed. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Mistura Valerianæ Composita, B.P.C.—(Mist. Valerian. Co.)—Compound Valerian Mixture. Each fluid ounce contains 10 grains of potassium bromide and 10 minims of ammoniated tincture of valerian in camphor water. Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

Tinctura Valerianæ Ammoniata, B.P.—(Tinct. Valerian. Ammon.)—Ammoniated Tincture of Valerian. 1 in 5, by maceration in a mixture of oils of nutmeg and lemon, dilute solution of ammonia and alcohol (60 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Tinctura Valerianæ Simplex, B.P.C.—(Tinct. Valerian. Simp.)—Simple Tincture of Valerian. *Syn.*—Tinctura Valerianæ. 1 in 8. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

VALERIANA INDICA
(Valerian. Ind.)
Indian Valerian

Synonyms—Valerianæ Indicæ Rhizoma; Indian Valerian Rhizome.

Indian valerian consists of the dried rhizome and roots of *Valeriana Wallichii* DC. (Fam. Valerianaceæ), a plant indigenous to the Himalayas.

The rhizome, which is dull yellowish-brown in colour, occurs in curved, cylindrical and slightly flattened pieces, about 5 centimetres in length and 10 millimetres in thickness. The upper surface bears numerous, raised, encircling leaf-scars, and the lower surface has prominent, circular root-scars and an occasional thick root. The fracture is short and horny. The smoothed, transverse surface shows a dark cortex and pith, a well-marked cambium line, and a ring of about a dozen small, pale wood bundles separated by wide medullary rays. The odour is valerianaceous but less aromatic than that of valerian, and the taste is bitter.

The diagnostic **microscopical** characters are the tabular cork cells; the resin cells of the cortex; the simple starch grains, about 15 to 20 microns wide, found in the cortex, rays and pith.

Indian valerian **contains** volatile oil, which consists chiefly of sesquiterpenes and contains also valeric acid, both free and in combination as esters. Arachidic acid, hentriacontane, and a mixture of fatty acids have been obtained from the non-volatile constituents of the drug.

Action and Uses.—Indian valerian closely resembles valerian in its properties and is used in India and the Eastern Colonies as a carminative and antispasmodic. An ammoniated tincture of Indian valerian (Tinctura Valerianæ Indicæ Ammoniata) may be prepared in the same way as ammoniated tincture of valerian.

VANILLA
(Vanill.)
Vanilla

Synonyms—Vanilla Pods; Vanilla Beans.

Vanilla consists of the cured, fully grown fruits of *Vanilla planifolia* Andr. (Fam. Orchidaceæ), a climbing plant indigenous to Mexico, but cultivated in Madagascar, Mexico, the Comoros, Réunion, Tahiti, the Seychelles and other places.

The fruit is a slender capsule, 10 to 25 centimetres long and 8 to 10 millimetres in diameter, flattened-cylindrical in shape, tapering towards each end, wrinkled and flexible, the best varieties being covered with minute, glistening crystals of vanillin. The interior of the fruit contains innumerable, minute, black seeds, embedded in a dark, aromatic, balsamic fluid, secreted by papillæ lining the cavity of the fruit.

Vanilla **contains** from 2 to 3 per cent. of vanillin; other constituents are vanillic acid, resin (about 4 per cent.), wax and fat (about 10 per cent.), and reducing sugars (about 10 per cent.). The odour and flavour of vanilla is not due entirely to the vanillin, but depends upon the presence of other aromatic substances as yet unidentified. The drug yields to alcohol (70 per cent.) from about 25 to 35 per cent. of extractive.

Varieties.—Vanilla varies very considerably in quality; Réunion (Bourbon), Mexico and Madagascar produce the finest kinds. The fruits from Tahiti contain a lower percentage of vanillin and have an odour slightly different from the other varieties.

Substitutes.—Vanillons, or West Indian vanilla, are the fruits of *Vanilla Pompona* Schiede, they are shorter and much broader than vanilla; they also differ in odour and flavour. Split vanilla beans are of inferior quality; they are generally the result of allowing the fruits to become too ripe before collection.

Uses.—Vanilla is used as a flavouring agent and in perfumery.

VANILLINUM
(Vanillin.)
Vanillin

$C_8H_8O_3 = 152{\cdot}1$

Synonym—Vanillic Aldehyde.

Vanillin, 4-hydroxy-3-methoxybenzaldehyde, $CH_3O{\cdot}C_6H_3(OH){\cdot}CHO$, is the odorous principle of vanilla and also occurs in Siam benzoin and balsams of Peru and tolu. It is produced synthetically from eugenol and from guaiacol. It occurs in the form of white, crystalline needles or colourless prisms, having the intense odour and taste of vanilla and an acid reaction. The natural substance has the finer flavour. It is completely extracted from its solution in ether by shaking with saturated aqueous solution of sodium bisulphite, from which vanillin may be reprecipitated by sulphuric acid. The aqueous solution gives with lead acetate a white precipitate of a lead compound soluble in hot water, from which it separates in scales on cooling.

The aqueous solution is coloured blue by ferric chloride, becoming brown on boiling; from the liquid, on cooling, a white precipitate of dihydrodivanillin separates. By the action of nascent hydrogen, vanillin is converted into vanillic alcohol, $C_8H_{10}O_3$; on oxidation, it yields odourless vanillic acid, $C_8H_8O_4$. The acid is also produced when vanillin is exposed to moist air. On fusing vanillin with potassium hydroxide, protocatechuic acid, $C_6H_3(OH)_2COOH$, results. When vanillin with twice its weight of pyrogallol is dissolved in alcohol, and hydrochloric acid added to the solution, a blue-violet colouration appears on evaporating the liquid in a porcelain dish; similarly, when phloroglucinol replaces the pyrogallol a fiery red colouration is produced on evaporation. The latter is the well-known Guenzburg's test for free hydrochloric acid in the stomach contents; the reaction is sensitive to 0·05 per cent. of free hydrochloric acid. Being liable

to deterioration from oxidation, vanillin should be **stored** in well-closed bottles in a cool place and protected from light.

Slightly **soluble** in water; more soluble in boiling water; readily soluble in alcohol, ether, chloroform, carbon disulphide, fatty and volatile oils and glycerin; soluble in aqueous solution of alkali hydroxides, forming compounds from which the vanillin is reprecipitated by acids.

Standard.—Vanillin melts between 80° and 82°. Ash, not more than 0·05 per cent. 0·1 gramme, warmed with alcoholic solution of sodium hydroxide and a drop of chloroform, produces no odour of phenyl isocyanide (absence of acetanilide).

Uses.—Vanillin is used as a flavouring agent and in perfumery.

VENTRICULUS DESICCATUS

(Ventricul. Desic.)

Desiccated Stomach

Desiccated stomach is prepared from the fresh whole stomach of the healthy pig, *Sus scrofa* Linn. The stomach is freed from extraneous fat, ground, and dried *in vacuo* at a temperature not exceeding 45°. The dry material is then defatted, dried without further application of heat and milled to a coarse powder. It occurs as a coarse, granular powder having a faint odour and a slight taste. It is sometimes known as stomach extract. Desiccated stomach contains a substance which is capable of causing an increase in the number of red blood cells when administered to patients suffering from pernicious anæmia. No method is known for the assay of desiccated stomach; the only satisfactory criterion of activity is actual clinical test on patients suffering from pernicious anæmia.

Almost **insoluble** in water.

Action and Uses.—Desiccated stomach is used in place of liver extract in the treatment of macrocytic hyperchromic anæmias, that is, pernicious anæmia, the hæmolytic anæmias of pregnancy and sprue, anæmia due to intestinal parasites, anæmia associated with cancer of the stomach and in the anæmia following the surgical removal of a portion of the stomach. It is thought that the substance which exerts a curative effect in these conditions is formed by the action of an intrinsic factor present in normal gastric juice upon an extrinsic factor present in the food digested. The product of the interaction is thermolabile, and after absorption it is converted in the liver into an antianæmic factor which is thermostable. Thus, theoretically, pernicious anæmia may result from a deficiency of either the extrinsic factor or of the intrinsic factor, or from an inability to absorb the product of interaction. In the preparation of desiccated stomach, the intrinsic factor is supplied by the mucous layer, and the extrinsic factor by the muscular tissue of the stomach.

Cases of pernicious anæmia respond to treatment with desiccated stomach in the same way as they do to liver extract. It is useful in cases which are unable to tolerate or do not respond to liver extract, and in some cases appears to exert a curative influence on the nervous symptoms of the disease. Since the response of different patients varies considerably, it is not possible to define the dose within rigid limits, and treatment must be controlled by frequent red blood cell counts. Usually 1 ounce (30 grammes) daily of an active preparation is sufficient as an initial dose, and this should be decreased as the red cell count increases. Response to treatment is shown by an increase in the reticulocytes in the circulating blood, reaching a peak in from seven to twelve days, and thereafter the red blood cells increase rapidly in numbers and the condition of the patient shows marked improvement. As the curative substance is destroyed by heat, desiccated stomach must not be taken in hot liquids (not above 45°). It may be taken in water, milk, wine, cold soup, or mixed with cold foods. Preparations of the mucous layer of the hog's stomach are similarly employed. These contain the intrinsic factor which reacts with protein in the food to produce the substance necessary for the cure of pernicious anæmia.

Dose.– 8 to 30 grammes ($\frac{1}{4}$ to 1 ounce).

VERATRINA

(Veratrin.)

Veratrine

Synonym—Amorphous Veratrine.

Veratrine is a mixture of alkaloids, of variable composition, obtained from sabadilla by exhausting the powdered seeds with alcohol. It occurs in the form of white or greyish-white, pulverent masses which are amorphous, odourless and have a very persistent bitter and intensely acrid taste, followed by a sensation of numbness. The powder is a powerful sternutatory. It is slightly hygroscopic in moist air. The alcoholic solution is alkaline to litmus. Its melting-point is indefinite and lies between 145° and 155°. When heated on a water-bath with strong hydrochloric acid, it dissolves with the formation of a blood-red colour which is permanent for several days. When mixed with about five times its weight of powdered sucrose and moistened with concentrated sulphuric acid, an intense green colour is produced, which slowly changes to blue.

Veratrine **contains** cevadine (crystallised veratrine), $C_{32}H_{49}O_9N$, veratridine, $C_{37}H_{53}O_{11}N$, cevadilline (sabadilline), $C_{34}H_{53}O_8N$, sabadine, $C_{29}H_{51}O_8N$, and cevine (sabadinine), $C_{27}H_{43}O_8N$. Cevadine, on hydrolysis, yields cevine and a mixture of tiglic and angelic acids, whilst veratridine is hydrolysed to veratric acid and a base which may be identical with cevine.

Almost **insoluble** in water; soluble in boiling water (1 in 1000),

alcohol (1 in 3), ether (1 in 6), chloroform (1 in 3) and olive oil (about 1 in 80); sparingly soluble in glycerin; freely soluble in diluted acids, but leaving slight traces of an insoluble, brown, resinous body; very soluble in benzene and amyl alcohol; insoluble in light petroleum.

Standard.—Veratrine leaves not more than 0·3 per cent. of ash. The 5 per cent. w/v solution in water acidified with hydrochloric acid remains clear on the addition of platinic chloride solution (limit of various foreign alkaloids).

Action and Uses.—Veratrine resembles aconitine in its action on the peripheral nerve endings; applied externally, it gives rise to tingling, followed by numbness and coldness, which may be followed by some irritation. Veratrine exerts a characteristic, stimulating direct action on all forms of muscle tissue, which is shown in the case of plain muscle by colic-like spasms of the intestine, exaggeration of the movements of the uterus, bladder, bronchioles, etc., and intense vasoconstriction. The vasoconstriction differs from that caused by adrenaline in that it affects also the pulmonary, coronary and cerebral vessels. The heart is first slowed to a slight extent and then quickened, the strength of systole being increased. Veratrine increases the irritability of striped muscle so as to increase the work it is capable of doing. In large doses the muscle contraction is prolonged, relaxation being long drawn out.

Veratrine is not used internally. It is applied in the form of ointment, or as Oleinatum Veratrinæ, for its analgesic properties in neuralgia, especially facial neuralgia, but must not be used where the skin is broken. It is extremely irritating to mucous membrane and should be handled with caution. In cases of **poisoning** by veratrine, the stomach tube should be used or an emetic administered. Stimulants and strong coffee should be given and the recumbent position maintained.

Preparations

Collodium Anodynum, B.P.C.—(Collod. Anodyn.)—Anodyne Collodion. *Syn.*—Anodyne Colloid. Aconitine, about 0·1 per cent., and veratrine, about 0·7 per cent., in acetone and acetone collodion.

Oleinatum Veratrinæ, B.P.C.—(Oleinat. Veratrin.)—Oleinate of Veratrine. Veratrine, 2 per cent. w/w, dissolved in oleic acid and olive oil.

Unguentum Veratrinæ, B.P.C.—(Ung. Veratrin.)—Veratrine Ointment. Veratrine, 2 per cent., in oleic acid and benzoinated lard.

VERATRUM ALBUM

(Verat. Alb.)

White Hellebore

Synonyms—Veratri Albi Rhizoma; White Hellebore Rhizome; Hellebore.

White hellebore consists of the dried rhizome and roots of *Veratrum*

album Linn. (Fam. Liliaceæ), a perennial, herbaceous plant common in the mountains of Central and Southern Europe, being especially abundant in the Alps and Pyrenees. It is usually collected in the late summer, freed from leaves, and sometimes deprived of its roots.

The rhizome is usually simple, about 5 centimetres in length and 20 millimetres in thickness, and crowned with the shrivelled remains of numerous leaf-bases. The upper part is nearly cylindrical, but the lower extremity is bluntly obconical or truncate. It is dull black in colour, the surface being rough and wrinkled, and showing numerous, minute, glistening crystals. Root-scars showing a slender, central xylem are numerous on the trimmed rhizome. The fracture is short; the fractured surface is compact and whitish, showing a narrow cortex separated from the stele by a dark, wavy endodermis. Brown, irregularly arranged bundles are numerous in the stele. The roots are stout and numerous, completely enveloping the rhizome; they are grey in colour and usually longitudinally shrivelled. The drug has an acrid taste, but little odour; the powder is strongly sternutatory.

The diagnostic **microscopical** characters are the dark brown, polygonal cork cells; the cortical parenchyma, containing simple and compound starch grains measuring 4 to 14 microns and bundles of acicular crystals of calcium oxalate; the yellowish cells of the endodermis, thickened on the inner and lateral walls, and the pitted vessels of the xylem. The root shows an outer layer of axially elongated, thickened, brown cells, and pitted, elongated cells of the endodermis.

White hellebore **contains** the crystalline alkaloids, jervine, rubijervine, pseudojervine, protoveratrine and protoveratridine, and an amorphous alkaloid, veratralbine or veratroidine, which may be a decomposition product of protoveratrine. Jervine is the most abundant alkaloid, but the physiological action is mainly due to protoveratrine, which is exceedingly poisonous, and is a powerful sternutatory. The amount of alkaloid varies from 0·5 to 1 per cent.

Action and Uses.—White hellebore was formerly used internally in dropsy and other disorders, and externally as a parasiticide in scabies, etc. It is now rarely employed in medicine.

VERATRUM VIRIDE

(Verat. Vir.)

Green Hellebore

Synonyms—Veratri Viridis Rhizoma; Green Hellebore Rhizome; American Hellebore; American Veratrum.

Green hellebore consists of the dried rhizome and roots of *Veratrum viride* Ait. (Fam. Liliaceæ), a perennial herb which is indigenous to Canada and the North-Eastern United States of America. It is collected in the autumn, generally halved or quartered to facilitate drying, and sometimes deprived of its roots.

The rhizome is about 5 to 8 centimetres long and 2 to 3·5 centimetres wide, sub-cylindrical and obconical below, and crowned with the remains of concentrically arranged leaf-bases which are cut off level with the top of the rhizome. It is grey and rough, and enveloped externally with very numerous, stout, yellowish-brown, transversely shrivelled roots. It has a bitter, acrid taste and the powder is strongly sternutatory.

The diagnostic **microscopical** characters are the bundles of acicular raphides about 60 microns long and 40 microns wide, individual raphides reaching a length of 70 microns, and the starch granules, which are simple or 2- to 4- compound, individual granules being 8 to 10, or up to 21, microns in length.

Green hellebore **contains** the same alkaloids as white hellebore and, in addition, is said to contain cevadine.

Standard.—Green hellebore contains not more than 5 per cent. of foreign organic matter.

Green hellebore, in powder (Pulvis Veratri Viridis : Pulv. Verat. Vir.), contains the constituents and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—The therapeutic value of green hellebore is due to its powerful effect as a cardiac, arterial and nerve sedative. In puerperal eclampsia it lowers the pulse rate and checks the convulsions. It has been administered in hyperpiesia for the rapid reduction of the blood pressure, the effect being more permanent than that of the nitrites. In aneurism, when the cardiac contractions are strong, it affords relief from pain, especially if given in conjunction with potassium iodide. Green hellebore may be **administered** in the form of the tincture.

Preparation

Tinctura Veratri, B.P.C.—(Tinct. Verat.)—Tincture of Green Hellebore. *Syn.*—Tincture of Veratrum. 1 in 10. Dose.– 0·3 to 2 millilitres (5 to 30 minims).

VIBURNUM
(Viburn.)

Black Haw

Synonyms—Viburni Cortex; Black Haw Bark.

Black haw consists of the dried bark of the root of *Viburnum prunifolium* Linn. (Fam. Caprifoliaceæ), a shrub or small tree abundant in the Central and Eastern United States of America.

The bark occurs in channelled or sometimes quilled pieces, 1 to 3 centimetres broad and seldom exceeding 4 millimetres in thickness. The outer surface of the young bark is brownish and smooth, and bears whitish, rounded lenticels; that of the old bark is brownish-grey,

deeply fissured and scaly. The inner surface is yellowish to reddish-brown, and striated or marked with elongated reticulations. Minute glistening points are visible on the outer surface. The fracture is short and granular, and the smoothed, transverse section exhibits a narrow, brown cork and a whitish cortex and phloem, in which are embedded conspicuous, scattered, comparatively large, yellowish groups of sclerenchyma. 0·5 gramme of the bark in powder, added to 5 millilitres of dilute sulphuric acid and warmed, evolves a distinct odour of valeric acid. The odour of the drug is slight, resembling that of valeric acid, and the taste is bitter and astringent.

The diagnostic **microscopical** characters are the numerous stone cells in ovoid masses; the abundant cluster-crystals of calcium oxalate scattered throughout the cortex and phloem; numerous patches of lignified cork cells; the absence of phloem fibres; the starch grains up to 15 microns in diameter.

Black haw **contains** a bitter principle, viburnin, together with fat, resin, tannin, valeric acid and traces of an amorphous, non-volatile alkaloid. The ash is about 4 to 8 per cent. It yields to alcohol (70 per cent.) about 14 per cent. of extractive.

Action and Uses.—Black haw depresses the medulla and spinal cord without affecting the higher cerebral centres; it therefore depresses respiration and induces a large fall in blood pressure, but these effects are obtained only with such large doses that they are without practical significance. It is **administered** as extract and liquid extract, and is used for its supposed sedative effect on the uterus, to prevent threatened abortion and to control hæmorrhage. Good results are said to have followed its administration in asthma, dysmenorrhœa and spasmodic affections of plain muscle, but reliable clinical evidence of its value is lacking.

Dose.– 1 to 2 grammes (¼ to ½ drachm).

Preparations

Elixir Viburni, B.P.C.—(Elix. Viburn.)—Elixir of Black Haw. *Syn.*—Elixir Viburni Prunifolii. Liquid extract of black haw, 1 in 8, with compound tincture of cardamom and aromatic elixir. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Elixir Viburni et Hydrastis, B.P.C.—(Elix. Viburn. et Hydrast.)—Elixir of Black Haw and Hydrastis. *Syn.*—Elixir Viburni Compositum; Compound Elixir of Viburnum Prunifolium. Liquid extract of black haw, 1 in 2, and extract of hydrastis, about 1 in 6, with oils of coriander and caraway, and glycerin. Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Extractum Viburni, B.P.C.—(Ext. Viburn.)—Extract of Black Haw. A soft extract. Dose.– 0·2 to 0·5 gramme (3 to 8 grains).

Extractum Viburni Liquidum, B.P.C.—(Ext. Viburn. Liq.)—Liquid Extract of Black Haw. 1 in 1. Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

This liquid extract was included in the British Pharmacopœia, 1914.

Liquor Caulophylli et Pulsatillæ Compositus, B.P.C.—(Liq. Cauloph. et Pulsat. Co.)—Compound Solution of Caulophyllum and Pulsatilla. Liquid extracts of caulophyllum, about 1 in 6, pulsatilla, 1 in 20, aletris, 1 in 10, and black haw, 1 in 5, with glycerin and alcohol (60 per cent.). Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

VINUM AURANTII
(Vin. Aurant.)

Orange Wine

Orange wine may be prepared by the fermentation of a saccharine solution containing fresh bitter-orange peel. It is a golden, sherry-coloured liquid with a taste and aroma resembling those of bitter-orange peel.

Standard.—Orange wine, determined by method II of the British Pharmacopœia for the determination of alcohol, contains not less than 12 per cent. and not more than 16 per cent. v/v of ethyl alcohol. It complies also with the Public Health (Preservatives in Food) Regulations, when it contains not more than 450 parts per million of sulphur dioxide, and no other preservative.

Uses.—Orange wine is used as a vehicle for cod-liver oil, quinine salts, etc., and is employed in the preparation of certain medicinal wines.

VINUM XERICUM
(Vin. Xeric.)

Sherry-type Wine

Sherry-type wine is prepared by the fermentation of the juice of fresh grapes, the fruit of *Vitis vinifera* Linn. (Fam. Vitaceæ), freed from seeds, stems and skins. It may be either true sherry, which is prepared only in Spain, or wine of a similar type prepared in other countries, e.g. South Africa or Australia. It is a yellowish-brown liquid with a pleasant aroma and flavour.

Standard.—Sherry-type wine, determined by method I of the British Pharmacopœia for the determination of alcohol, contains not less than 16 per cent. v/v of ethyl alcohol. Specific gravity, 0·990 to 1·000. It contains not less than 0·4 per cent. w/v of total acids, calculated as tartaric acid, $C_4H_6O_6$. It complies also with the Public Health (Preservatives in Food) Regulations, when it contains not more than 450 parts per million of sulphur dioxide, and no other preservative.

Assay.—Titrate 25 millilitres with N/5 sodium hydroxide, using phenolphthalein as indicator; each millilitre of N/5 sodium hydroxide is equivalent to 0·01500 gramme of total acids, calculated as tartaric acid, $C_4H_6O_6$.

Uses.—Sherry was used formerly for preparing several medicated wines; sherry-type wine is now often used for the same purpose.

Preparation

Vinum Xericum Detannatum, B.P.C.—(Vin. Xeric. Detann.)—Detannated Sherry-type Wine. Sherry-type wine detannated with gelatin.

VIOLA CRYSTALLINA
(Viola Crys.)

Crystal Violet

Synonym—Methyl-rosaniline.

Crystal violet (Colour Index No. 681) is the hydrochloride of hexamethylpararosaniline, and may be prepared by the action of dimethylaniline on tetramethyldiaminobenzophenone chloride. It occurs in greenish-bronze crystals or powder. It is precipitated from aqueous solution by tannic acid, and is decolourised by the action of hydrochloric acid and zinc dust, a blue colour being produced on the further addition of a slight excess of ammonia. On the gradual addition of hydrochloric acid to a 0·2 per cent. aqueous solution, the colour changes through bluish-green and green to brownish-yellow, and on further dilution of the solutions the colours are restored in reverse order. The colour base is precipitated by alkalis.

Soluble in water (1 in 20), glycerin (1 in 16) and alcohol (1 in 20); the solution has a violet colour and is decomposed by exposure to light; insoluble in ether.

Standard.—Crystal violet leaves not more than 5 per cent. of sulphated ash. Arsenic limit, 10 parts per million. Dissolve the sulphated ash from 1 gramme in 20 millilitres of water and 2 millilitres of dilute hydrochloric acid and add 1 millilitre of potassium ferrocyanide solution; no precipitate is formed (limit of zinc).

Action and Uses.—Crystal violet is a powerful antiseptic, and is considered to possess a selective action on gram-positive organisms. For local use in gynæcological practice a solution is used containing crystal violet and brilliant green; Liquor Tinctorium is a suitable preparation. Crystal violet has been administered intravenously, in doses of 0·005 gramme ($\frac{1}{12}$ grain) per kilogram of body weight, in the treatment of staphylococcal septicæmia. Solutions must be freshly prepared and should contain not more than 1 part of the dye in 200 of distilled water. For both local and intravenous use, crystal violet is preferable to methyl violet and to the commercial gentian violet which may contain a large proportion of dextrin. Solutions of crystal violet may be sterilised by heating at 100° for thirty minutes.

Preparation

Liquor Tinctorium, B.P.C.—(Liq. Tinctor.)—Solution of Brilliant Green and Crystal Violet. Brilliant green and crystal violet, of each 0·5 per cent. w/v, in a mixture of equal parts of alcohol (90 per cent.) and distilled water.

VIRIDE MALACHITUM
(Virid. Malachit.)

Malachite Green

Malachite green (Colour Index No. 657) is the oxalate of *pp'*-tetramethyldiaminotriphenylcarbinol anhydride, $2C_{23}H_{25}N_2,3H_2C_2O_4$,

and may be prepared by the condensation of benzaldehyde with dimethylaniline in the presence of sulphuric acid, oxidation of the product with lead peroxide in acid solution, and separation as oxalate by the addition of ammonia and oxalic acid. It occurs as green plates with a metallic sheen. The aqueous solution becomes reddish-yellow on the addition of hydrochloric acid, and a greenish-white precipitate of the colour base separates on the addition of an alkali. The colour base can be crystallised from benzene and melts at about 132°. The leuco-base is formed on reduction, and is reconverted into the colour base on oxidation.

Soluble in water and alcohol.

Standard.—Malachite green leaves not more than 1 per cent. of sulphated ash. Arsenic limit, 10 parts per million. Dissolve the sulphated ash from 1 gramme in 20 millilitres of water and 2 millilitres of dilute hydrochloric acid, and add 1 millilitre of potassium ferrocyanide solution; no precipitate is formed (limit of zinc).

Action and Uses.—Malachite green is employed as an antiseptic and disinfectant for dressing wounds, especially in the form of a spray, but is now largely replaced by brilliant green. It should not be applied to mucous membranes and, if alcohol is used as a solvent, the spirit should be allowed to evaporate before applying the dressing. Its action varies greatly with different organisms; it is more strongly inhibitory to gram-positive than to gram-negative organisms. A solution of 1 in 2000 is stated to kill *Staphylococcus aureus* in serum, and a solution of 1 in 5000 to destroy the spores of *Bacillus subtilis*. A solution of 1 in 40,000 is said to kill anthrax bacilli in two hours, but to kill typhoid bacilli in the same time a solution of 1 in 300 is said to be required. It is sometimes used with mercuric chloride in the form of a recently prepared mixture of equal parts of 2 per cent. solutions in alcohol (80 per cent.).

VIRIDE NITENS
(Virid. Nit.)

Brilliant Green

Brilliant green (Colour Index No. 662), $C_{27}H_{33}N_2 \cdot SO_4H$, is the sulphate of tetraethyldiaminotriphenylcarbinol anhydride, and may be prepared by oxidising the product of condensation between diethylaniline and benzaldehyde and converting it into the sulphate. It occurs in small, glistening, golden crystals. The aqueous solution becomes reddish-yellow on the addition of hydrochloric acid, and a pale green precipitate of the colour base is formed on the addition of an alkali. The solution becomes colourless on reduction with zinc and hydrochloric acid, and the colour is not restored immediately on exposure to air,

but is restored by oxidising agents such as chromic acid. Brilliant green (fat-soluble) is the stearate of brilliant green base.

Soluble in water and alcohol.

Standard.—Brilliant green leaves not more than 5 per cent. of sulphated ash. Arsenic limit, 25 parts per million. Lead limit, 100 parts per million. Dissolve the sulphated ash from 1 gramme in 20 millilitres of water and 2 millilitres of dilute hydrochloric acid and add 1 millilitre of potassium ferrocyanide solution; no precipitate is produced (limit of zinc).

Action and Uses.—Brilliant green is an antiseptic and disinfectant, and is especially useful in the treatment of wounds. In solution, 1 in 2000 to 1 in 1000 of distilled water or hypertonic saline, it is non-irritating and powerfully bactericidal in action while being harmless to phagocytes and to the tissues. Exuberant growths of bright red granulation tissue form early. It is, therefore, used in preparing granulating surfaces for grafts. It is to some extent inactivated by blood serum and hence must be frequently renewed in an infected wound. It may be used for the irrigation of wounds by Carrel's method in place of Dakin's solution. A 1 in 1000 solution of brilliant green in an aqueous solution of allantoin (0·25 per cent.) is commonly used to promote epithelialisation after radical mastoid operations, 20 drops being instilled into the cavity after cleansing the wound. Solutions of brilliant green may be prepared by aseptic methods.

An ointment containing 1 to 2 per cent. of brilliant green dissolved in a small quantity of alcohol and incorporated with soft paraffin has been found to be most useful in the treatment of superficial wounds and minor injuries. A paste containing brilliant green, 1 part, boric acid, 275 parts, purified talc, 25 parts, and liquid paraffin, 200 parts, is used for filling wound cavities. Brilliant green mixed with an equal quantity of crystal violet is known as "violet green," and in solution as Liquor Tinctorium it forms a very efficient application for sterilising the skin. In special skin areas such as the perianal region, this solution is preferable to iodine, since it is non-irritating while being actively antiseptic. A 5 per cent. w/v aqueous solution of brilliant green has been used as a local treatment in erysipelas. The solution is painted over the affected areas once or twice daily. It gives relief to the patient and limits the spread of the infection, causing the rash and fever to disappear rapidly.

Brilliant green appears to have a selective action on bacteria. It has been found to kill the gram-positive organisms, *Bacillus subtilis* and *Staphylococcus aureus*, at dilutions of 1 in 15,000,000 and 1 in 4,000,000 respectively, while a concentration of 1 in 600,000 was required to kill the gram-negative *B. coli*, but another closely related gram-negative organism, *B. dysenteriæ*, was killed by a dilution of 1 in 1,500,000. It has a specially inhibitory action on the usual types of *B. coli*, and this renders it of particular service in certain bacteriological examinations. For example, there is the brilliant green enrichment method for the isolation of the enteric group in fæces

which depends on the fact that in fluid media containing certain concentrations of brilliant green the typhoid-paratyphoid bacilli grow well, while the growth of *B. coli* is partly or completely inhibited, and the former organisms can be enriched at the expense of the latter.

Preparation

Liquor Tinctorium, B.P.C.—(Liq. Tinctor.)—Solution of Brilliant Green and Crystal Violet. Brilliant green and crystal violet, of each 0·5 per cent., in a mixture of equal parts of alcohol (90 per cent.) and distilled water.

VISCUM
(Visc.)

Mistletoe

Mistletoe consists of the dried, evergreen, dicœcious semi-parasite, *Viscum album* Linn. (Fam. Loranthaceæ), which grows on the branches of deciduous trees, chiefly apple, poplar and plum.

The drug occurs as a mixture of broken stems and leaves and occasional fruits. The repeatedly forked stem is largely broken into separate internodes, which are slender, glabrous and yellowish-green, up to about 12 centimetres long and 3 millimetres in diameter, enlarged at the ends, where there is a double scar, and longitudinally wrinkled; the smaller proportion of older stems are brownish-green, and attain a diameter of about 7 millimetres and show both transverse and longitudinal wrinkles. The leaves are opposite, glabrous, coriaceous and yellowish-green; they are about 5 centimetres long, oblanceolate, with entire margins, rounded apices, and 4 or 5 parallel, longitudinal veins. The fruit is about 7 millimetres in diameter, irregularly wrinkled and yellowish-brown. The drug is odourless and has an insipid taste.

Mistletoe **contains** an amorphous, resinous body, viscin, inositol, ursone, a wax alcohol, palmitic acid, choline, invert sugar and a pectin-like carbohydrate. It yields to water about 23 per cent. of extractive.

Substitute.—*Phoradendron flavescens* Nutt. is known as mistletoe in the United States of America. It has similar but shorter leaves of a more yellow colour, and is somewhat pubescent.

Action and Uses.—On account of its vasodilator action, mistletoe has been used for lowering blood pressure. Its action is usually delayed and a maximum effect is reached three to four days after the commencement of treatment. It is also said to lessen the cardiac impulse and to relieve precordial distress, effects which are probably due to the dilatation of the peripheral vessels. It has also been found useful in cases of hysteria and chorea. Mistletoe is **administered** as a soft extract in pills, or as an infusion or tincture (1 in 8).

YOHIMBA
(Yohimb.)
Yohimbe

Synonyms—Yohimbe Bark; Yohimbæ Cortex.

Yohimbe is the bark obtained from *Pausinystalia yohimba* Pierre ex Beille (Fam. Rubiaceæ), a tree indigenous to the Cameroons and the French Congo.

The bark occurs in flat or channelled pieces, 2 to 10 or sometimes up to 20 millimetres thick, with a varying tinge of red in the grey-brown or brown outer and inner surfaces. The cork is firmly adherent, longitudinally furrowed, and bears numerous, narrow, transverse cracks at fairly regular intervals of 1 to 2 centimetres. The inner surface is reddish-brown and smooth, with very fine longitudinal striations. The bark breaks easily with a soft, almost velvety fracture, which is splintery and shortly fibrous in the inner part. A few grains of the bark scraped from the inner surface, shaken with a mixture of 5 drops of strong solution of ammonia and 10 millilitres of water, gradually develop a colour varying from wine-red to distinct reddish-brown. The drug is odourless, and has a slightly bitter taste.

The diagnostic **microscopical** characters are, in the transverse section, the characteristic beaded appearance, due to the alternation of bast fibres with parenchymatous cells in the outer zone of the bast, the bast fibres being mostly isolated and only occasionally in tangential groups of two or three.

Yohimbe **contains** as the chief constituent the alkaloid, yohimbine (quebrachine). It also contains *iso*yohimbine (*meso*yohimbine), dihydroyohimbine, *allo*yohimbine, yohimbene, and a number of other alkaloids. The total amount of alkaloid varies from 0·3 to 1·5 per cent.

Substitute.—The bark of *P. macroceras* (K. Sch.) Pierre differs from yohimbe bark chiefly in the arrangement of the bast fibres, which in the outer zone of the bast are usually in tangential groups of two, and in the brown colour, with sometimes a slight tinge of red, which it yields to very dilute ammonia. It contains a pharmacologically inactive alkaloid, yohimbinine.

Use.—Yohimbe is used principally as the source of yohimbine.

YOHIMBINÆ HYDROCHLORIDUM
(Yohimb. Hydrochlor.)
Yohimbine Hydrochloride

$C_{21}H_{26}O_3N_2,HCl = 390{\cdot}7$

Yohimbine hydrochloride is the hydrochloride of the principal alkaloid of yohimbe bark. The alkaloid is probably identical with quebrachine found in white quebracho bark, *Aspidosperma Quebracho* Schlecht. Yohimbine hydrochloride may be obtained by treating the ether-soluble alkaloids of yohimbe bark with alcoholic hydrogen chloride, and triturating the resinous mixture of hydrochlorides, so

precipitated, with acetone. The crude hydrochloride can be purified by crystallisation from hot water or alcohol. It occurs as a white, odourless, crystalline powder having a bitter taste.

A solution of yohimbine hydrochloride in water is neutral or faintly acid to litmus. It melts at about 300°. 0·01 gramme dissolved in 1 millilitre of sulphuric acid develops no colour, but on adding a minute crystal of potassium dichromate, violet streaks appear, the solution becoming slate blue and finally changing to green. A few milligrams of yohimbine hydrochloride added to 2 or 3 drops of fuming nitric acid immediately becomes dark green and finally forms a yellow solution which, on the addition of 2 millilitres of alcoholic potassium hydroxide solution, develops a cherry-red colour. 0·01 gramme moistened with about 3 drops of sulphuric acid and the mixture well stirred with about 0·05 gramme of ammonium vanadate produces a violet colour, but on dilution with water the liquid does not become reddish in colour (distinction from strychnine).

Soluble in cold water (1 in 100); more soluble in hot water and alcohol.

Standard.—Yohimbine hydrochloride loses, on drying at 100°, not more than 2 per cent. of its weight, and the dried material has a specific rotation of about +100° in water. Ash, not more than 0·1 per cent. The addition of a few drops of sodium carbonate solution to 10 millilitres of a 1 per cent. solution of the hydrochloride in water produces a white precipitate of yohimbine which, after being washed with water and dried in a desiccator, has a melting-point of 230° to 235°.

Action and Uses.—Yohimbine is an aphrodisiac, and its action as such is said to be superior to that of strychnine in that, whilst strychnine increases all reflexes, yohimbine increases only the pelvic reflexes. It exerts an anæsthetic action upon sensory nerve terminations. It lowers blood pressure by dilating vessels; this action is exerted upon the walls of the vessels themselves, and affects most vessels, such as those of the skin, kidney, intestines and external genital organs. It increases the depth and frequency of respiration. Poisonous doses paralyse respiration. It is employed hypodermically or by the mouth as a sexual stimulant in impotence. It is usually given in the form of the hydrochloride, and the salt may be **administered** in pills, which should be prepared with lactose and glycerin of tragacanth, and also in tablets. For hypodermic injection, a 1 per cent. solution is usually prepared. Solutions of yohimbine hydrochloride for **injection** may be sterilised by heating at 100° for thirty minutes or by filtration, and the containers should comply with the tests for limit of alkalinity of glass.

Dose.—0·003 to 0·008 gramme ($\frac{1}{20}$ to $\frac{1}{8}$ grain).

YOHIMBINA.—Yohimbine, regenerated from the hydrochloride, crystallises from dilute alcohol in colourless needles. It is readily soluble in alcohol and chloroform, and sparingly soluble in ether. Yohimbine has been described formerly under the name of Corynina.

ZANTHOXYLUM
(Zanthox.)

Zanthoxylum

Synonyms—Prickly Ash Bark; Toothache Bark; Xanthoxylum.

Zanthoxylum consists of the dried bark of *Zanthoxylum americanum* Mill. (northern prickly ash) or *Z. Clava-Herculis* Linn. (southern prickly ash), (Fam. Rutaceæ), two American shrubs, the former growing in the Northern, Middle and Western States and the latter in the South, from Virginia to Texas.

Northern prickly ash bark occurs in curved or quilled, brownish-grey fragments, about 0·5 to 3 millimetres thick, from 2 to 15 centimetres in length, and up to 3·5 centimetres wide. Externally, it is brown to brownish-black, with greyish patches of lichens bearing numerous black apothecia, and bears numerous white lenticels and occasional small emergences ending in spines. The fracture is short. The yellowish-white inner surface exhibits fine longitudinal striations and numerous glistening crystals. Southern prickly ash bark occurs in irregularly oblong, flattened or curved pieces, and occasionally in single quills from 5 to 40 centimetres long, 1 to 10 centimetres wide, and 1 to 4 millimetres thick. The outer surface is frequently marked with prominent, limpet-shaped, conical, corky emergences, often bearing stout spines; the inner surface is obscurely striated longitudinally, and shows many small, glistening crystals. Both barks have a slight odour and a bitter, acrid, pungent taste.

The diagnostic **microscopical** characters are the numerous, nearly spherical starch grains, from 2 to 10 microns in diameter; the stone cells up to 150 microns in length, and frequently containing reddish-brown contents; the irregular fragments of nearly colourless, lignified cork cells; the numerous glands containing droplets of secretion; the crystals of calcium oxalate from 10 to 250 microns in length.

Zanthoxylum **contains** two resins, one acrid, the other crystalline and bitter. Southern prickly ash also contains a bitter, alkaloidal principle resembling berberine, and northern prickly ash contains a crystalline phenol, xanthoxylin. The total ash is about 6 per cent., and the acid-insoluble ash about 0·3 per cent.

Standard.—Zanthoxylum contains not more than 2 per cent. of foreign organic matter.

Zanthoxylum, in powder (Pulvis Zanthoxyli : Pulv. Zanthox.), contains the constituents, and possesses the diagnostic microscopical characters of the unground drug.

Action and Uses.—Zanthoxylum acts as a carminative and stimulant to the gastro-intestinal tract, and produces, after absorption, some diuresis and diaphoresis. It has been **administered** in the form of a liquid extract, with belladonna and hyoscyamus, in the treatment of alcoholism.

Dose.– 1 to 2 grammes (¼ to ½ drachm).

ZINCI ACETAS
(Zinc. Acet.)

Zinc Acetate

$C_4H_6O_4Zn,2H_2O = 219{\cdot}5$

Zinc acetate, $Zn(CH_3{\cdot}COO)_2,2H_2O$, may be prepared by neutralising acetic acid with zinc carbonate or oxide, filtering the solution while hot, and crystallising. It occurs in the form of thin, soft, white, glistening, translucent plates or monoclinic crystals of a pearly lustre, and having a faint, acetous odour and a sharp, disagreeable, metallic taste. On exposure, the salt gradually effloresces, loses acetic acid, and becomes converted into a basic salt. The aqueous solution of the salt loses acetic acid also on boiling and deposits the basic salt. When heated, it partly fuses, losing its water of crystallisation and acetic acid; at a higher temperature it is decomposed, with evolution of acetone, etc., leaving a residue of zinc oxide. By drying over sulphuric acid at ordinary temperature the anhydrous salt may be obtained. It should be **stored** in well-stoppered bottles.

Soluble in water (1 in 2·5), boiling water (4 in 1), alcohol (1 in 40) and boiling alcohol (1 in 3).

Standard.—Zinc acetate, determined by the method of the British Pharmacopœia for Zinci Sulphas, contains not less than 99·5 per cent. of $C_4H_6O_4Zn,2H_2O$; each millilitre of M/5 potassium iodate is equivalent to 0·007315 gramme of $C_4H_6O_4Zn,2H_2O$. 1 gramme complies with the limit test for chlorides. 1 gramme complies with the limit test for sulphates. 0·1 gramme complies with the limit test for iron. The aqueous solution is neutral or only faintly acid to litmus. It complies with the limit test for copper, aluminium, nickel, manganese, and magnesium in Zinci Sulphas.

Action and Uses.—Zinc acetate closely resembles zinc sulphate in its action. It is employed in the form of lotion as an astringent in ophthalmia.

Dose.– 0·06 to 0·12 gramme (1 to 2 grains); as an emetic, 0·6 gramme (10 grains).

ZINCI BROMIDUM
(Zinc. Brom.)

Zinc Bromide

$ZnBr_2 = 225{\cdot}2$

Zinc bromide may be prepared by dissolving zinc in hydrobromic acid, filtering the solution through asbestos or glass wool, concentrating, acidifying with a little hydrobromic acid, and evaporating to dryness on a water-bath, or by stirring 36 parts of freshly ignited zinc oxide with 150 parts of water, gradually adding 288 parts of 25 per cent. w/w hydrobromic acid, or sufficient to give a weak but distinctly

acid reaction, and evaporating the solution to dryness on a water-bath. It occurs as a white or nearly white, very deliquescent, odourless, granular powder, having a sharp, saline, styptic, metallic taste. It sometimes contains basic salt, and is then not completely soluble in water. The aqueous solution has a slightly acid reaction to litmus. Zinc bromide melts at about 394°, with partial decomposition, forming a colourless or yellowish liquid boiling at about 700° and, out of contact with air, subliming in needle-shaped crystals.

Soluble in water (4 in 1), alcohol (2 in 1) and ether.

Standard.—Zinc bromide, determined by the method of the British Pharmacopœia for Zinci Sulphas, contains not less than 95 per cent. of $ZnBr_2$; each millilitre of M/5 potassium iodate is equivalent to 0·007507 gramme of $ZnBr_2$.

Action and Uses.—Zinc bromide has been used in epilepsy, but the small amount of bromide present in the doses administered for this purpose has little effect. It is best administered in mixture form with dilute hydrobromic acid. It is **incompatible** with borax and with soluble carbonates.

Dose.– 0·12 to 0·3 gramme (2 to 5 grains).

ZINCI CARBONAS
(Zinc. Carb.)

Zinc Carbonate

Synonyms—Hydrated Zinc Carbonate; Zinc Subcarbonate.

Zinc carbonate is a basic carbonate, and may be prepared by the interaction of zinc sulphate and sodium carbonate. It occurs as a dry, white, odourless, tasteless, impalpable, amorphous powder. When strongly heated it loses water and carbon dioxide, leaving a residue of zinc oxide. It varies slightly in composition, corresponding approximately to the formula $ZnCO_3,2ZnO,3H_2O$.

Insoluble in water and alcohol; soluble in dilute nitric and other mineral acids with effervescence, and in acetic acid, solution of ammonia and solution of ammonium carbonate.

Standard.—Zinc carbonate yields on ignition not less than 68 per cent. of residue. Arsenic limit, 10 parts per million. 0·5 gramme with 3 millilitres of nitric acid complies with the limit test for chlorides. 0·2 gramme with 2 millilitres of hydrochloric acid complies with the limit test for sulphates. 0·1 gramme complies with the limit test for iron. Dissolve 2 grammes in 20 millilitres of water and 5 millilitres of glacial acetic acid; the solution remains clear on the addition of 5 drops of potassium chromate solution (limit of lead).

Action and Uses.—Zinc carbonate is a mild astringent and protective to the skin, and is sometimes used in place of zinc oxide or calamine in dusting powders and lotions.

ZINCI CHLORIDUM
(Zinc. Chlorid.)
Zinc Chloride
$ZnCl_2 = 136{\cdot}3$

Zinc chloride may be obtained by dissolving zinc in hydrochloric acid, evaporating the resulting solution, fusing the residue and pouring into moulds to solidify. It occurs in the form of opaque, white sticks or masses, or as a white, or nearly white, granular powder; it is very deliquescent and caustic. On heating, it melts to a clear liquid at about 260°, and at a higher temperature it is partly volatilised, forming dense white fumes and leaving a residue of zinc oxide. Heated in a current of chlorine it sublimes unchanged in acicular crystals. Zinc chloride almost always contains some oxychloride and is therefore not completely soluble in water; the aqueous solution is alkaline to methyl orange; if made neutral to methyl orange by the addition of a few drops of dilute hydrochloric acid, a clear solution is obtained. When the aqueous solution is heated, hydrogen chloride is given off and a precipitate of zinc oxychloride forms.

Soluble in water (1 in less than 1), alcohol (90 per cent.) (about 1 in 1·5) and glycerin (1 in 2).

Standard, B.P.—Zinc chloride contains zinc equivalent to not less than 95 per cent. of $ZnCl_2$. It complies also with limit tests for oxychloride and for ammonia.

Action and Uses.—Zinc chloride is a powerful caustic and astringent, and is principally employed externally as a lotion (1 in 25 to 1 in 50) for offensive ulcers and for application to wounds. It is sometimes applied in the form of a paste or pencil to lupus and ulcerous sores. It burns deeply and does not spread over the surrounding parts. For ophthalmic use, lotions or drops of 1 grain in 1 fluid ounce are employed, sometimes with the addition of cocaine. A solution of zinc chloride in water, 1 in 200, is said to be a good deodorant. Liquor Zinci Chloridi is used as a disinfectant and deodorant, and may be conveniently employed for dispensing zinc chloride in solution; 4 minims of the solution contains approximately 3 grains of zinc chloride.

Solutions of zinc chloride generally become turbid owing to the formation of oxychloride; a slight opalescence in eye drops of zinc chloride may be disregarded; on no account should acid be added to dissolve it. When solutions of zinc chloride are required to be filtered, asbestos or glass wool should be used, since paper and cotton wool are dissolved by them. When zinc oxide is moistened with a strong solution of zinc chloride, an oxychloride is formed which sets into a hard mass; this forms the basis of some dental cements. **Poisoning** by zinc chloride is characterised by corrosion and inflammation of the mucous membrane of the mouth and stomach, which is usually rendered white. Ulceration, often followed by perforation, may also be evident. Treatment consists in the liberal administration of alkali carbonate, milk, or white of egg.

Preparation

Liquor Zinci Chloridi, B.P.C.—(Liq. Zinc. Chlorid.)—Solution of Zinc Chloride. It contains zinc chloride equivalent to about 40 per cent. of metallic zinc.

This solution, prepared by a process which included a method for the removal of lead and iron, if present, was included in the British Pharmacopœia, 1914.

ZINCI IODIDUM

(Zinc. Iod.)

Zinc Iodide

$ZnI_2 = 319{\cdot}2$

Zinc iodide may be prepared by digesting 3 parts of zinc granules or filings with 10 parts of iodine in 20 parts of water until the liquid has become colourless or nearly so, or by dissolving zinc oxide or carbonate in hydriodic acid The solution is filtered through asbestos or glass wool, and rapidly evaporated to dryness at a gentle heat. It occurs as a yellowish-white, granular, odourless, crystalline powder, having a sharp, saline, styptic, metallic taste. It is very deliquescent and on exposure to air and light becomes brown due to liberation of iodine. The aqueous solution is acid to litmus. Zinc iodide melts at about 446° forming a colourless liquid, and at a higher temperature it sublimes, forming quadratic needles, but partly decomposing with liberation of iodine and leaving a residue of zinc oxide. This decomposition also occurs at ordinary temperatures on long exposure to light and air.

Freely **soluble** in water, alcohol and ether.

Standard.—Zinc iodide, determined by the method of the British Pharmacopœia for Potassii Iodidum, contains not less than 98 per cent. of ZnI_2; each millilitre of M/20 potassium iodate is equivalent to 0·01596 gramme of ZnI_2. Arsenic limit, 5 parts per million. 1 gramme complies with the limit test for sulphates. 0·1 gramme complies with the limit test for iron.

Action and Uses.—Zinc iodide has been employed in epilepsy and in tertiary syphilis. The iodide is present in too small an amount to exert much effect, however, and the salt is now rarely used. It is best administered in solution, well diluted.

Dose.– 0·03 to 0·12 gramme ($\frac{1}{2}$ to 2 grains).

CADMII IODIDUM.—Cadmium iodide, CdI_2, occurs as nearly colourless, odourless, shining, crystalline flakes, having a nauseous, metallic taste. It melts at about 390° to 400°, forming an amber-coloured liquid, and decomposes at a dull red heat with evolution of iodine vapours. It is soluble in water (1 in 1), the solution having an acid reaction, in boiling water (1 in 0·75), and in alcohol. The action of cadmium iodide resembles that of zinc salts, although it is a more powerful emetic. It is now rarely employed except as a reagent.

ZINCI OLEOSTEARAS

(Zinc. Oleostear.)

Zinc Oleostearate

Zinc oleostearate is prepared as follows:—Dissolve 20 parts of hard soap and 10 parts of curd soap in 150 parts of water with the aid of heat; dissolve 10 parts of zinc sulphate in 20 parts of boiling water, and add it to the former solution; stir well, separate the oleostearate, wash with hot water until free from sulphate, then cool, dry and powder the product. Old or partly dried soap should not be used. It occurs as a white, amorphous powder having a faint odour resembling that of fat.

Insoluble in water, alcohol and ether.

Standard.—Zinc oleostearate, determined by the method of the British Pharmacopœia for Zinci Stearas, contains not less than 12 per cent. and not more than 14 per cent. of zinc, calculated as ZnO. It complies with the limit tests for alkalis and alkaline earths, and free fatty acids in Zinci Stearas.

Action and Uses.—Zinc oleostearate is used to protect the surface of the skin in excoriations, to allay irritation, and to absorb discharges in moist eczematous conditions. It may be used as a compound dusting powder, such as Pulvis Zinci Oleostearatis Compositus, or in the form of an ointment.

Preparations

Linimentum Calaminæ Compositum, B.P.C.—(Lin. Calamin. Co.)—Compound Liniment of Calamine. Calamine, 1 in 10, with zinc oxide, zinc oleostearate, wool fat, white soft paraffin and liquid paraffin.

Pulvis Zinci Oleostearatis Compositus, B.P.C.—(Pulv. Zinc. Oleostear. Co.)—Compound Zinc Oleostearate Powder. Zinc oleostearate and boric acid, of each 1 in 4, with starch, perfumed with oil of geranium.

Unguentum Zinci Oleatis, B.P.—(Ung. Zinc. Oleat.)—Ointment of Zinc Oleate. *Syn.*—Zinc Oleate Ointment. Freshly precipitated zinc oleate, 50 per cent., in white soft paraffin.

ZINCI OXIDUM

(Zinc. Oxid.)

Zinc Oxide

$ZnO = 81{\cdot}38$

Zinc oxide may be obtained by the combustion of metallic zinc in a current of air, or by igniting zinc carbonate. It occurs as a soft, white or faintly yellowish-white, amorphous powder, free from grittiness, and without odour or taste. When strongly heated it becomes yellow, but changes to white again on cooling. It gradually absorbs carbon dioxide and moisture when exposed to the air. By heating with magnesium it is reduced to metallic zinc with explosive violence. It

forms cement-like products when mixed with a strong solution of zinc chloride or with phosphoric acid, owing to the formation of oxy-salts; when required for this purpose, zinc oxide of high density is preferable. It dissolves in dilute mineral acids with formation of salts, and in solutions of alkali hydroxides with formation of zincates. Commercial zinc oxide, manufactured for use as a pigment, is known as "zinc white."

Insoluble in water and alcohol (95 per cent.).

Standard, B.P.—Zinc oxide contains not less than 99 per cent. of ZnO, calculated on the freshly ignited substance. Loss on ignition, not more than 1 per cent. Arsenic limit, 10 parts per million. It complies also with a test for absence of metallic zinc, and with limit tests for lead and iron.

Action and Uses.—The salts of zinc resemble those of copper in so far as they are caustic and astringent, but as antiseptics the copper salts are superior. Zinc salts are given internally for their supposed sedative action on the central nervous system in epilepsy, chorea and hysteria, but their usefulness is doubtful. Their absorption is slow and incomplete. Zinc oxide is less astringent than the soluble salts and has been given in pills to check the night-sweats of phthisis, but its action compared with that of atropine is very feeble.

Zinc oxide has a wide application externally in the form of dusting powders, ointments, pastes and lotions as a mild astringent for the skin, as a soothing and protective application in eczema, and as a protective to slight excoriations. Mixed with boric acid it is useful to check excessive perspiration. Zinc oxide is usually **administered** in pills, often with dry extract of belladonna. The inhalation of zinc oxide during the combustion of the metal results in fever, headache, nausea and cramp, followed by perspiration and rapid recovery—a condition known as brass-founder's ague.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains)

STANNI OXIDUM.—Stannic oxide, SnO_2, may be prepared by burning the metal in air, or by oxidising it with nitric acid and igniting the residue. It occurs as a greyish-white powder and is insoluble in water and hydrochloric acid, but reacts with caustic alkalis forming soluble stannates which yield a precipitate of stannic acid on adding acid to an aqueous solution. The crude product frequently contains an appreciable amount of lead and is commonly known as "putty powder." Tin and its salts appear to possess a specific action against infections due to staphylococci, and tin oxide, often associated with free tin, is administered for the treatment of boils, carbuncles and acne. It has been stated that during the treatment of boils by tin the output of chlorides and urea in the urine is simultaneously increased. As the boils disappear, excretion of chloride and urea again becomes normal. Dose.– 0·5 to 1 gramme (8 to 15 grains) daily.

TITANI OXIDUM.—Titanic oxide, or titanium dioxide, TiO_2, is the most stable oxide of titanium, and occurs in an impure form as rutile. It may be prepared by burning the metal in oxygen, or by ignition of the hydroxide produced by the addition of alkalis to solutions of titanic salts, or by boiling solutions of titanates. It occurs as a whitish powder, insoluble in water. It is amphoteric and, when in the hydrated form, will dissolve in acids to produce colourless titanic compounds, and in alkalis, yielding titanates. It is reduced only with the greatest difficulty.

Titanic oxide is used as an ingredient of face powders and other toilet articles of like nature. It is also used in preparing titanium paints, which have a greater covering power than lead paints and are non-poisonous, unaffected by light, and not discoloured by the usual impurities in the air. The trivalent salts of titanium are strong reducing agents.

Preparations

Cremor Zinci, B.P.C.—(Crem. Zinc.)—Zinc Cream. Zinc oxide, about 1 in 3, with wool fat, almond oil and solution of calcium hydroxide.

Emplastrum Zinci Oxidi, B.P.C.—(Emp. Zinc. Oxid.)—Zinc Oxide Plaster. It is spread with rubber adhesive compound containing not less than 20 per cent. of zinc oxide.

Gelatinum Zinci, B.P.—(Gelat. Zinc.)—Gelatin of Zinc. *Syn.*—Unna's Paste. Zinc oxide, 15 per cent., with gelatin, glycerin and water.

This gelatin, prepared with a larger proportion of glycerin, was included in the British Pharmaceutical Codex, 1923, under the name of Pasta Zinci et Gelatini.

Gelatinum Zinci et Ichthammolis, B.P.C.—(Gelat. Zinc. et Ichtham.)—Gelatin of Zinc and Ichthammol. *Syn.*—Pasta Zinci et Ichthammolis; Unna's Paste with Ichthammol. Ichthammol, about 2 per cent., with zinc oxide, glycerin, gelatin and distilled water.

Ligamentum Pastæ Zinci, B.P.C.—(Ligament. Past. Zinc.)—Zinc Paste Bandage. It is prepared with a paste containing 17 per cent. of zinc oxide.

Linimentum Calaminæ Compositum, B.P.C.—(Lin. Calamin. Co.)—Compound Liniment of Calamine. Calamine, 1 in 10, with zinc oxide, zinc oleostearate, wool fat, white soft paraffin, and liquid paraffin.

Pasta Picis Carbonis, B.P.C.—(Past. Pic. Carbon.)—Coal Tar Paste. Coal tar, about 3·5 per cent., with compound paste of zinc oxide.

Pasta Resorcinolis, B.P.C.—(Past. Resorcin.)—Resorcinol Paste. *Syn.*—Pasta Resorcini; Resorcin Paste; Lassar's Stronger Resorcin Paste. Resorcinol, zinc oxide and starch, of each about 20 per cent., with liquid paraffin.

Pasta Resorcinolis Mitis, B.P.C.—(Past. Resorcin. Mit.)—Mild Resorcinol Paste. *Syn.*—Pasta Resorcini Mitis; Mild Resorcin Paste; Lassar's Mild Resorcin Paste. Resorcinol, about 10 per cent., zinc oxide and starch, of each about 25 per cent., with liquid paraffin.

Pasta Zinci Oxidi Composita, B.P.—(Past. Zinc. Oxid. Co.)—Compound Paste of Zinc Oxide. *Syn.*—Zinc Paste. Zinc oxide, 25 per cent., with starch and white soft paraffin.

Pasta Zinci Oxidi cum Acido Salicylico, B.P.C.—(Past. Zinc. Oxid. c. Acid. Salicyl.)—Paste of Zinc Oxide with Salicylic Acid. *Syn.*—Lassar's Paste. Salicylic acid, 2 per cent., with zinc oxide, starch and white soft paraffin.

Pilulæ Zinci Oxidi et Belladonnæ, B.P.C.—(Pil. Zinc. Oxid. et Bellad.)—Zinc Oxide and Belladonna Pills. Each pill contains 2 grains of zinc oxide and ¼ grain of dry extract of belladonna. Dose.—1 pill.

Pulvis Zinci et Acidi Borici, B.P.C.—(Pulv. Zinc. et Acid. Boric.)—Zinc and Boric Acid Powder. Equal parts of zinc oxide and boric acid.

Pulvis Zinci et Acidi Salicylici, B.P.C.—(Pulv. Zinc. et Acid. Salicyl.)—Zinc and Salicylic Acid Powder. Zinc oxide, 1 in 5, and salicylic acid, 1 in 20, with starch.

Pulvis Zinci et Amyli, B.P.C.—(Pulv. Zinc. et Amyli)—Zinc and Starch Powder. Equal parts of zinc oxide and starch.

Pulvis Zinci et Amyli Compositus, B.P.C.—(Pulv. Zinc. et Amyli Co.)—Compound Zinc and Starch Powder. Equal parts of zinc oxide, starch, boric acid and purified talc, perfumed with oil of geranium.

Suppositorium Hamamelini et Zinci Oxidi, B.P.C.—(Supp. Hamamel. et Zinc. Oxid.)—Hammamelin and Zinc Oxide Suppository. Each suppository weighs 30 grains (2 grammes) and contains 3 grains of dry extract of hamamelis and 10 grains of zinc oxide.

Unguentum Hydrargyri Ammoniati et Zinci Oxidi, B.P.C.—(Ung. Hydrarg. Ammon. et Zinc. Oxid.)—Ammoniated Mercury and Zinc Oxide Ointment. Ointment of ammoniated mercury and ointment of zinc oxide, equal parts.

Unguentum Hydrargyri, Plumbi et Zinci, B.P.C.—(Ung. Hydrarg. Plumb. et Zinc.)—Mercury, Lead and Zinc Ointment. *Syn.*—Unguentum Metallorum. Ointment of mercuric nitrate, ointment of lead subacetate and ointment of zinc oxide, equal parts.

Unguentum Zinci cum Balsamo Peruviano, B.P.C.—(Ung. Zinc. c. Bals. Peruv.)—Zinc Ointment with Balsam of Peru. Balsam of Peru, about 11 per cent., in ointment of zinc oxide and ointment of boric acid.

Unguentum Zinci cum Benzoino, B.P.C.—(Ung. Zinc. c. Benzoin.)—Ointment of Zinc Oxide with Benzoin. Compound tincture of benzoin, about 12·5 per cent. v/w, in ointment of zinc oxide.

Unguentum Zinci et Olei Ricini, B.P.C.—(Ung. Zinc. et Ol. Ricin.)—Zinc and Castor Oil Ointment. Zinc oxide and castor oil in benzoinated lard. It is of the same composition as a mixture of equal weights of castor oil and the zinc ointment of the British Pharmacopœia, 1914.

Unguentum Zinci et Olei Ricini cum Benzoino, B.P.C.—(Ung. Zinc. et Ol. Ricin. c. Benzoin.)—Zinc and Castor Oil Ointment with Benzoin. Zinc oxide, castor oil and compound tincture of benzoin, with benzoinated lard. The proportions of zinc oxide and benzoinated lard are equivalent to about 40 per cent. of the zinc ointment of the British Pharmacopœia, 1914.

Unguentum Zinci Morrhuatis, B.P.C.—(Ung. Zinc. Morrh.)—Zinc Morrhuate Ointment. Cod-liver oil, about 14 per cent., and zinc oxide, about 32 per cent., with solution of calcium hydroxide, purified talc and balsam of Peru, in beeswax, wool fat and white soft paraffin.

Unguentum Zinci Oxidi, B.P.—(Ung. Zinc. Oxid.)—Ointment of Zinc Oxide. *Syn.*—Unguentum Zinci; Zinc Ointment. Zinc oxide, 15 per cent., in simple ointment.

ZINCI PERMANGANAS

(Zinc. Permang.)

Zinc Permanganate

$ZnMn_2O_8,6H_2O = 411{\cdot}3$

Zinc permanganate, $Zn(MnO_4)_2,6H_2O$, may be prepared by adding a concentrated solution of barium permanganate to a concentrated solution of zinc sulphate until a precipitate of barium sulphate ceases to form. The precipitate is separated, the clear solution evaporated carefully at a low temperature to crystallisation, or *in vacuo* over sulphuric acid, and the crystals finally dried at about 40°. It occurs in the form of dark brown, nearly black, iridescent, deliquescent crystals. When heated slowly it loses water and oxygen, leaving a residue of zinc manganate. Zinc permanganate gives up oxygen more readily than does the potassium salt, hence great care should be taken in bringing it in

contact with easily oxidisable substances. It should be **stored** in well-closed bottles and protected from light.

Soluble in water (1 in 3), generally leaving a slight residue.

Standard.—Zinc permanganate contains not less than 90 per cent. of $ZnMn_2O_8,6H_2O$. Boil 1 gramme with 10 millilitres of hydrochloric acid until chlorine ceases to be evolved, dilute to 30 millilitres with water and add 1 millilitre of dilute sulphuric acid; no turbidity is produced within five minutes (limit of barium).

Assay.—Dissolve about 0·15 gramme, accurately weighed, in water, filter through asbestos, and acidify the filtrate with 5 millilitres of dilute sulphuric acid; warm to 60°, add 50 millilitres of N/10 oxalic acid, and titrate the excess with N/10 potassium permanganate; each millilitre of N/10 oxalic acid is equivalent to 0·004113 gramme of $ZnMn_2O_8,6H_2O$.

Action and Uses.—Zinc permanganate resembles the potassium salt in its oxidising properties, but is more astringent. It is used chiefly in urethritis (1 grain in 8 fluid ounces), either as an injection or as a urethral douche. The **incompatibles** of zinc permanganate are those of potassium permanganate, but the former is even more readily reduced by contact with organic matter.

ZINCI PHENOLSULPHONAS

(Zinc. Phenolsulphon.)

Zinc Phenolsulphonate

$C_{12}H_{10}O_8S_2Zn,8H_2O = 555·7$

Synonym—Zinc Sulphocarbolate.

Zinc phenolsulphonate, $(C_6H_4(OH)SO_3)_2Zn,8H_2O$, may be prepared by decomposing a solution of the barium salt with the exact equivalent of zinc sulphate, whereby barium sulphate is precipitated while zinc phenolsulphonate remains in solution and is obtained by evaporation and crystallisation. Zinc phenolsulphonate occurs in the form of colourless, transparent, rhombic prisms or tabular crystals, which may become slightly pink on exposure to light and air; it is efflorescent and usually odourless, but sometimes has a faint odour of phenol. The aqueous solution is acid to litmus. On heating at 100°, it loses 6 molecules of water of crystallisation, and the remainder is lost at 125°; at higher temperatures it chars, emitting inflammable vapours having the odour of phenol, and finally leaving a residue of zinc sulphate.

Soluble in water (1 in 2), boiling water (3 in 1), alcohol (1 in 2·5) and boiling alcohol (2 in 1).

Standard.—Zinc phenolsulphonate, determined by the method of the British Pharmacopœia for Zinci Sulphas, contains not less than 99·5 per cent. of $C_{12}H_{10}O_8S_2Zn,8H_2O$; each millilitre of M/5 potassium iodate is equivalent to 0·01852 gramme of $C_{12}H_{10}O_8S_2Zn,8H_2O$.

Arsenic limit, 5 parts per million. 2 grammes complies with the limit test for sulphates.

Action and Uses.—Zinc phenolsulphonate is rarely given internally. Externally, it has been employed as an astringent and antiseptic injection in leucorrhœa and gonorrhœa (3 grains to 1 fluid ounce), and as a spray for the throat and nose (5 grains to 1 fluid ounce). It has an action similar to that of zinc sulphate, but is somewhat more antiseptic.

ZINCI PHOSPHIDUM
(Zinc. Phosphid.)
Zinc Phosphide
$Zn_3P_2 = 258{\cdot}2$

Zinc phosphide may be prepared in small amounts only by heating phosphorus with finely powdered metallic zinc. For the preparation on a larger scale, the vapours of phosphorus are led over fused zinc in a current of dry hydrogen. It occurs as dark grey, minutely crystalline fragments with a metallic lustre, or as a steel-grey, crystalline powder having a slight odour of phosphorus, but emitting it more strongly when triturated. The powder has the appearance of reduced iron and a slight taste of phosphorus. Out of contact with air it melts at a higher temperature than zinc and sublimes unchanged, condensing in needles, but when heated in the presence of air it is oxidised to zinc phosphate.

Insoluble in water and alcohol; soluble in acids, with evolution of hydrogen phosphide which is not spontaneously inflammable; by nitric acid it is converted into zinc phosphate.

Standard.—Zinc phosphide contains not less than 70 per cent. of Zn_3P_2. The gas evolved on the addition of excess of dilute sulphuric acid is completely absorbed by a strong solution of copper nitrate (absence of free zinc).

Assay.—Place about 0·25 gramme, accurately weighed, in a flask fitted with a funnel provided with a stop-cock and connected with a suitable absorption apparatus containing silver nitrate solution; pass a current of carbon dioxide through the apparatus, pour a mixture of 20 millilitres of water and 50 millilitres of 2N sulphuric acid through the funnel and, after the initial reaction has subsided, gently warm the flask for thirty minutes; transfer the silver nitrate solution to a beaker, add a slight excess of hydrochloric acid and filter the solution; determine the phosphoric acid in the filtrate as magnesium pyrophosphate; 1 gramme of magnesium pyrophosphate is equivalent to 1·159 gramme of Zn_3P_2.

Action and Uses.—Zinc phosphide possesses the properties of free phosphorus. Being very stable, and not liable to oxidation by trituration, it is well adapted for **administration** in pills. Acid

vegetable extracts should not be used with zinc phosphide since they may cause the evolution of hydrogen phosphide.

Dose.– 0·003 to 0·016 gramme ($\frac{1}{20}$ to $\frac{1}{4}$ grain).

ZINCI STEARAS
(Zinc. Stear.)

Zinc Stearate

Zinc stearate may be prepared by the interaction of zinc sulphate and curd soap by a method similar to that described for Zinci Oleostearas. It consists chiefly of zinc stearate, $(C_{17}H_{35}COO)_2Zn$, but contains also a variable proportion of zinc palmitate, $(C_{15}H_{31}COO)_2Zn$, and usually a small amount of zinc oleate, $(C_{17}H_{33}COO)_2Zn$. Zinc stearate occurs as a light, white, impalpable, amorphous powder free from gritty particles, and having a slight, characteristic odour. When boiled with dilute hydrochloric acid, the fatty acids are liberated and form an oily layer on the surface of the liquid. On heating it melts, and at a higher temperature it decomposes with evolution of inflammable vapours and the odour of burning fat, leaving finally a residue of zinc oxide.

Insoluble in water, alcohol (90 per cent.) and ether.

Standard, B.P.—Zinc stearate contains zinc equivalent to not less than 13 per cent. and not more than 15·5 per cent. of ZnO. It is neutral to litmus, and complies also with limit tests for alkalis and alkaline earths, free fatty acids and sulphate.

Action and Uses.—Zinc stearate is recommended as a soothing and mildly antiseptic preparation for acne, eczema and other skin affections. It is used either alone, or combined with other powders, for purposes similar to those for which zinc oleostearate is used.

ZINCI SULPHAS
(Zinc. Sulph.)

Zinc Sulphate

$ZnSO_4,7H_2O = 287·5$

Zinc sulphate may be obtained by dissolving zinc in dilute sulphuric acid or by roasting zinc blende, a native zinc sulphide, in air, extracting the product with water and crystallising from the resulting solution. It occurs in colourless, odourless, somewhat efflorescent, transparent crystals or as a crystalline powder, having an astringent, metallic taste. The aqueous solution is acid to litmus, but not to methyl orange. When gradually heated to 50°, it loses 5 molecules of its water of crystallisation, or 31·2 per cent. of its weight, without melting; at 100° it loses another molecule, and the last molecule is lost at about 248°, with decomposition, sulphur dioxide and oxygen being evolved

and a residue of zinc oxide remaining. Zinc sulphate is isomorphous with magnesium sulphate. Crude zinc sulphate is sometimes known as "white vitriol" or "white copperas."

Soluble in water (1 in 0·7), boiling water (1 in 0·2); insoluble in alcohol (90 per cent).

Standard, B.P.—Zinc sulphate contains not less than 99·5 per cent. and not more than the equivalent of 101 per cent. of $ZnSO_4,7H_2O$. Arsenic limit, 5 parts per million. It complies also with limit tests for acidity, for copper, aluminium, nickel, manganese and magnesium, and for chloride and iron.

Action and Uses.—Zinc sulphate is now rarely administered internally except as a reflex emetic. For this purpose doses up to 2 grammes (30 grains) are required. It is especially useful as an emetic in narcotic poisoning, but it must not be given for its emetic action in the presence of much chloride, since zinc chloride may be formed and ulceration may ensue. Zinc sulphate is used externally principally as an astringent lotion for indolent ulcers and to assist granulation. Such lotions are also employed to relieve chronic inflammation of mucous membranes in gonorrhœa and conjunctivitis. For the latter purpose, ½ to 1 grain in 1 fluid ounce of water is commonly employed. Solutions of zinc sulphate are used for ionisation. Zinc sulphate is **incompatible** with alkali carbonates and hydroxides, and with astringent infusions and decoctions. In cases of **poisoning,** the procedure described under Zinci Chloridum should be followed.

Dose.– As an astringent, 0·06 to 0·2 gramme (1 to 3 grains); as an emetic, 0·6 to 2 grammes (10 to 30 grains).

Preparations

Collyrium Acidi Borici et Zinci, B.P.C.—(Collyr. Acid. Boric. et Zinc.)—Boric Acid and Zinc Eye Lotion. Each fluid ounce contains about 4 grains of boric acid and 1 grain of zinc sulphate in distilled water.

Lotio Rubra, B.P.C.—(Lot. Rub.)—Red Lotion. *Syn.*—Red Wash. Zinc sulphate, about 0·45 per cent. w/v, with compound tincture of lavender and distilled water.

Pulvis Zinci Sulphatis Compositus, B.P.C.—(Pulv. Zinc. Sulph. Co.)—Compound Zinc Sulphate Powder. *Syn.*—Pulvis Acidi Borici Compositus; Compound Boric Acid Powder; Pulvis Antisepticus Solubilis; Soluble Antiseptic Powder. Zinc sulphate, 1 in 8, with eucalyptol, menthol, phenol, salicylic acid, thymol and boric acid.

ZINCI VALERIANAS

(Zinc. Valer.)

Zinc Valerianate

$C_{10}H_{18}O_4Zn,2H_2O = 303·6$

Synonym—Zinc Valerate.

Zinc valerianate, $Zn(C_5H_9O_2)_2,2H_2O$, may be prepared by mixing hot solutions of sodium valerianate and zinc sulphate, or by saturating

valerianic acid with zinc carbonate, the product being dried at a low temperature. It occurs in the form of white, lustrous, pearly scales or as a white powder, having the odour of valerianic acid and a sweet, astringent and metallic taste. Zinc valerianate may also be obtained anhydrous or containing only one molecule of water of crystallisation, according to the method of preparation. The aqueous solution is slightly acid to litmus and, when boiled, becomes turbid from loss of valerianic acid and formation of a basic salt. On exposure to air the salt slowly loses valerianic acid. It should be **stored** in well-stoppered bottles.

Soluble in water (1 in 120), alcohol (1 in 60) and ether (1 in 500).

Standard.—Zinc valerianate yields, on treatment with nitric acid and subsequent gentle ignition, not less than 25 per cent. and not more than 28 per cent. of ZnO. Arsenic limit, 5 parts per million. The residue from 5 grammes complies with the limit test for lead in Zinci Oxidum. 0·5 gramme complies with the limit test for sulphates.

Action and Uses.—Zinc valerianate has been administered in pill form in the treatment of hysteria and other nervous disorders, often in combination with valerianates of quinine and iron, or with compound galbanum pill.

Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

AMMONII VALERIANAS.—Ammonium valerianate occurs in colourless, very deliquescent crystals having an odour of valerianic acid. The commercial salt is usually an acid salt containing ammonia equivalent to only about 35 per cent. of $C_4H_9 \cdot COONH_4$. It should be stored in well-stoppered bottles. It is soluble in water and alcohol. Ammonium valerianate has been given for the same purposes as the zinc salt. It may be administered in neutral solution, with the addition of orange flower water to mask its disagreeable taste and odour. Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

Preparation

Pilulæ Ferri Valerianatis Compositæ, B.P.C.—(Pil. Ferr. Valer. Co.)—Compound Iron Valerianate Pills. *Syn.*—Pilulæ Trium Valerianatum. Each pill contains 1 grain each of the valerianates of iron, quinine and zinc. Dose.– 1 or 2 pills.

ZINGIBER
(Zingib.)

Ginger

Ginger consists of the rhizome of *Zingiber officinale* Roscoe (Fam. Zingiberaceæ), scraped to remove the dark outer layer and dried in the sun. It is known in commerce as unbleached Jamaica ginger. Ginger is indigenous to Asia, but is cultivated in the West Indies, Africa, Java and other tropical countries. The procedure in Jamaica is to dig up the sympodially branching, horizontally growing rhizome after the aerial parts have died down, wash, peel with a narrow-bladed knife, again wash, and dry in the sun.

Ginger occurs in laterally-flattened, branched rhizomes known as "races" or "hands," about 7 to 15 centimetres long, 1·5 to 6·5 (usually 3 to 4) centimetres high, and 1 to 1·5 centimetres wide; the branches, known as "fingers," arise from the upper surface of the rhizome, widen, contract, and terminate in a stem-scar; they average about 2 centimetres in length. Externally, the rhizome is buff-coloured, striated longitudinally and somewhat fibrous due to the leaf traces exposed by the scraping. The fracture is short, with projecting fibres. The smoothed, transverse surface exhibits under a lens numerous yellow oil cells and scattered vascular bundles, and an endodermis separating the narrow cortex from the wide stele. The odour is agreeable and aromatic and the taste is strongly pungent.

The diagnostic **microscopical** characters are the thin-walled cells of the ground tissue containing abundant starch grains, which are single, ovate to sub-rectangular, up to 40 microns long, 25 microns wide and 7 microns thick, with the hilum in a slight terminal beak; the spiral or reticulate vessels, which give no characteristic reaction for lignin and are often accompanied by narrow, dark brown pigment cells; the sub-spherical oil cells with suberised walls; the absence of cork, sclerenchymatous cells and calcium oxalate crystals.

Ginger **contains** from about 1 to 3 per cent. of volatile oil (specific gravity, 0·875 to 0·885; optical rotation, −25° to −45°), in which camphene, phellandrene, zingiberene, cineole, citral and borneol have been detected, and to which it owes its aroma. The pungency of ginger is due to a yellowish, oily body, gingerol, which rapidly loses its pungency when warmed with 2 per cent. w/v sodium hydroxide solution. Gingerol is a mixture of homologous phenolic substances of the formulæ $C_{17}H_{26}O_4$, $C_{18}H_{28}O_5$, etc. Baryta water splits it up into fatty aldehydes, especially *n*-heptaldehyde and zingerone (4-hydroxy 3-methoxyphenylethylmethylketone). The latter is crystalline and pungent. Ginger also contains shogaol, resin and much starch.

Substitutes.—Jamaica ginger is sometimes limed to whiten it, and is then known as "limed" ginger. Cochin and Calicut gingers are in smaller "hands," and the branches are usually shorter and thicker; they are often imported only partly scraped ("unscraped" or "coated"), and may be bleached (limed) or unbleached. African ginger is more pungent (alcohol-soluble extractive about 5 to 8 per cent.), but less aromatic; it is usually small, dark and coated, but may also be found limed. Japanese ginger is commonly in small, flattened pieces; many of the starch grains are compound, and the oil differs in its physical character (specific gravity, about 0·894; optical rotation, about +9°), these particulars indicating that it is not produced by *Zingiber officinale;* it has been referred to *Z. Mioga* Roscoe. Ground ginger is often adulterated with exhausted ("spent") ginger, a sophistication that may be detected by a diminution in the ash soluble in water, as well as by the yields of alcohol and water-soluble extractive.

Standard, B.P.—Ginger yields to alcohol (90 per cent.) not less than 4·5 per cent. of extractive, and to water not less than 10 per cent. of extractive. Ash, not more than 6 per cent. Water-soluble ash, not less than 1·7 per cent.

Ginger, in powder (Pulvis Zingiberis : Pulv. Zingib.), contains the constituents and possesses the diagnostic microscopical characters of

Zingiber, and complies with the limit for alcohol-soluble extractive, water-soluble extractive, ash and water-soluble ash of the unground drug.

Action and Uses.—Ginger has carminative properties and is chiefly used as a stomachic and as a flavouring agent. For this reason it is often prescribed with sodium bicarbonate, and is sometimes added to purgative medicines to prevent griping. Ginger is **administered** as Tinctura Zingiberis Fortis, Tinctura Zingiberis Mitis, or as Syrupus Zingiberis, generally in mixture form. The strong tincture is often taken on a lump of sugar. For use in pills or tablets, Oleoresina Zingiberis is suitable.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

Preparations

Oleoresina Zingiberis, B.P.C.—(Oleores. Zingib.)—Oleoresin of Ginger. *Syn.*—Gingerin. The acetone-soluble matter of ginger. Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

Syrupus Zingiberis, B.P.—(Syr. Zingib.)—Syrup of Ginger. Strong tincture of ginger, 5 per cent. v/v, in syrup. Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Tabellæ Zingiberis Compositæ, B.P.C.—(Tab. Zingib. Co.)—Compound Tablets of Ginger. *Syn.*—Ginger Mint Tablets. Each tablet contains 5 grains of sodium bicarbonate and $\frac{1}{10}$ grain of oleoresin of ginger, with ammonium bicarbonate, saccharin and ⅛ minim of oil of peppermint. Dose.– 1 or 2 tablets.

Tinctura Zingiberis Fortis, B.P.—(Tinct. Zingib. Fort.)—Strong Tincture of Ginger. *Syn.*—Essence of Ginger. 1 in 2, by percolation with alcohol (90 per cent.). Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

Tinctura Zingiberis Mitis, B.P.—(Tinct. Zingib. Mit.)—Weak Tincture of Ginger. Strong tincture of ginger, 20 per cent. v/v, in alcohol (90 per cent.). Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

PART II

SURGICAL DRESSINGS

The British Pharmaceutical Codex

PART II

SURGICAL DRESSINGS

Surgical dressings include bandages, gauzes, lints, plasters, tissues, tows, wools and various protectives. In the specifications a number of technical terms are used, the meanings of which are as follows :— **Yarn** consists of cotton, wool, or other fibres, spun and prepared for use in weaving. **Warp** is the term applied to the threads that run the long way of the fabric, that is, longitudinally, and **weft** to those that run the short way, that is, transversely. **Fineness** or **count** of yarn, in cotton, refers to the number of hanks, each of 840 yards, that make up one pound weight of such yarn, and in wool, signifies the number of hanks, each of 560 yards, that make up one pound weight; thus "thirty-sixes" in cotton means that 36 hanks, as described, weigh one pound. **Foreign matter** is the name given to the non-fibrous materials which are often found in a fabric. In fabrics which have not been subjected to any finishing process, this foreign matter is usually referred to as "size", and in the finished cloth as "filling". Size is applied to the warp primarily to reduce chafing in the loom, but substances are often added to the size in order to increase the weight of the cloth. Filling is not added for sizing purposes, but is applied to the cloth to give a desired finish or to increase the weight. Substances commonly used in sizing are wheat flour, potato, maize and sago starches, together with softening agents such as tallows, oils and waxes, or glycerin. When it is required to add weight to the warp yarn, and consequently to the ultimate cloth, china clay, magnesium chloride, etc., may be added. In order to prevent mildew, an antiseptic such as zinc chloride is sometimes used. Substances used for filling purposes include most of the above, also other starches, dextrin, and magnesium and sodium sulphates. **Neps** are small tangled masses of cotton fibres, the result of imperfect growth, or produced in manufacture. The term **moisture regain** is used to denote the percentage of moisture to be added to the dried material to adjust the weight to that of the material of normal moisture content.

The **Sterilisation** of surgical dressings may be effected by the methods described in Appendix XII.

Moisture, water-soluble extractive, foreign matter, cotton and wool in fabrics and unmedicated dressings are determined by the following methods:—

Moisture.—Weigh accurately about 5 grammes of the dressing, and dry at 100°; the loss in weight is moisture.

Water-soluble Extractive.—The dried sample from the moisture determination is boiled in water for a period of five minutes, and the operation is repeated six times; the washed residue is then dried at 100° and weighed. The loss in weight is the water-soluble extractive.

Foreign Matter.—The dried sample from the moisture determination is boiled twice for periods of five minutes in water to remove soluble salts. Tallow, oils, or waxes are removed by treatment with a boiling solution of a neutral soap, or by extraction with a suitable grease solvent. Starch, if present, is removed by treatment at about 50° with a solution of malt extract and subsequent boiling in water. Insoluble matter, such as china clay, if present, is removed by continual agitation and squeezing of the sample in numerous wash waters. All the solutions and wash waters used are passed through a fine sieve, and any loose threads or fibres added to the residue, which is then dried at 100° and weighed. The loss in weight is foreign matter. In the case of grey unbleached cotton, an allowance of 3 per cent. is made for loss of natural impurities by the above treatment. An ash determination is made upon a portion of the cleaned sample in order to ascertain whether all insoluble matter has been removed, and a correction of 0·2 per cent. is allowed for the natural ash of cotton.

Cotton and Wool.—The dried material from the determination of foreign matter is placed in a boiling 5 per cent. w/v solution of sodium hydroxide in water, and boiled for about ten minutes. The residue is then removed and given a further similar treatment. It is next well washed with water until free from alkali. All the solutions and wash waters used are passed through a fine sieve, and any loose threads or fibres added to the residue, which is then dried at 100° and weighed. In the case of unbleached cotton, an addition of 4 per cent. is made to this weight to allow for the loss of natural constituents of the cotton which occurs with the sodium hydroxide treatment. The weight thus obtained is that of the dry cotton, and the difference between this figure and that of the dried material from the foreign matter determination is the weight of the dry wool. To the weights of dry cotton and dry wool standard moisture regains of 8·5 and 16 per cent., respectively, are added.

BATTISTA
(Battist.)

Battiste

Battiste consists of a bleached cotton fabric of plain weave, evenly proofed on both sides by treatment with rubber solution so that the material is impervious to water. The surface is non-adhesive. It is "heat vulcanised" and not "cold cured," free from resins and acidity, and does not become acid when stored.

Standard.—Battiste, when boiled with water for thirty minutes, or when subjected to steam in a steriliser for twenty minutes at a pressure of 15 pounds per square inch, does not become sticky or show any appreciable deterioration. Weight per square yard, not less than 5 ounces; weight of the fabric per square yard, after the removal of the proofing and other foreign matter and correcting for the natural moisture regain, not less than 2 ounces. The difference between the weight per square yard of the battiste and the weight of the fabric is not less than 3 ounces. Average number of threads per inch, not less than 104 in the warp and not less than 72 in the weft. The component yarns are of good uniform grade, and the material is reasonably free from weaving defects.

CARBASUS ABSORBENS

(Carbas. Absorb.)

Absorbent Gauze

Synonym—Unmedicated Gauze.

Absorbent gauze consists of cotton cloth of plain weave. It is supplied 36 inches wide and in various lengths. Waxed paper should not be used for wrapping absorbent gauze, since it reduces the absorbency of the material. Its absorbency may also be reduced considerably by medication. Aseptic absorbent gauze is absorbent gauze in a sterile condition. It may be **sterilised** as described in Appendix XII, and should be sealed in containers suitable for maintaining the gauze in a sterile condition.

Standard.—Absorbent gauze is composed of yarns of good medium, uniform grade, and the material is well bleached to a good white, clean, free from added foreign matter, and reasonably free from leaf and shell. Water-soluble extractive, not more than 0·5 per cent. Weight per square yard, not less than 180 grains. Average number of threads per inch, not less than 19 in the warp and not less than 15 in the weft. 1 gramme, free from selvedge, compressed to a volume of about 20 millilitres and placed lightly by means of a forceps on the surface of water at about 20°, becomes saturated within ten seconds.

CARBASUS ABSORBENS IN TÆNIA

(Carbas. Absorb. in Tæn.)

Absorbent Ribbon Gauze

Synonym—Unmedicated Ribbon Gauze.

Absorbent ribbon gauze consists of cotton cloth of plain weave. It is supplied in ribbons, of various widths and lengths, having fast

selvedge edges and wound on spools or packed in bottles. Aseptic absorbent ribbon gauze is absorbent ribbon gauze in a sterile condition. It may be **sterilised** as described in Appendix XII, and should be sealed in containers suitable for maintaining the gauze in a sterile condition.

Standard.—Absorbent ribbon gauze is composed of yarns of good medium, uniform grade, and the material is well bleached to a good white, clean, free from added foreign matter. and reasonably free from leaf and shell. Water-soluble extractive, not more than 0·5 per cent. Weight of a piece 2 inches wide and 6 yards long, not less than 190 grains, and the weights of other widths in proportion. Average number of threads per inch, not less than 30 in the warp and not less than 25 in the weft. 1 gramme, when tested for absorbency as described under Carbasus Absorbens, becomes saturated within ten seconds.

CARBASUS ACIDI BORICI

(Carbas. Acid. Boric.)

Boric Acid Gauze

Synonym—Boric Gauze.

Boric acid gauze is absorbent gauze impregnated with boric acid, and may be prepared by immersing absorbent gauze in a sufficient quantity of a saturated solution of boric acid in boiling distilled water lightly tinted pink with a suitable dye, removing the material from the solution, pressing sufficiently to produce a gauze which, when dried, is absorbent, uniformly medicated as far as possible, and contains from 10 to 20 per cent. of boric acid. Boric acid ribbon gauze, varying in width from $\frac{1}{4}$ inch to 2 inches, may be prepared in a similar manner from absorbent ribbon gauze. Boric acid gauze should be **packed** in sealed packets, doubly wrapped.

Standard.—Boric acid gauze contains not less than 10 per cent. and not more than 20 per cent. of H_3BO_3.

Assay.—Place in a stoppered bottle a quantity of gauze equivalent to about 0·25 square yard in area, accurately weighed. Add 50 millilitres of hot, freshly boiled water and 40 millilitres of glycerin, shake thoroughly, cool, and titrate with N/1 sodium hydroxide, using phenolphthalein or phenol violet as indicator; each millilitre of N/1 sodium hydroxide is equivalent to 0·06184 gramme of H_3BO_3.

CARBASUS CHLORAMINÆ

(Carbas. Chloram.)

Chloramine Gauze

Chloramine gauze is absorbent gauze impregnated with chloramine, and may be prepared by immersing absorbent gauze in a sufficient

quantity of an aqueous solution of chloramine, removing the material from the solution, and pressing sufficiently to produce a gauze which, when dried, is absorbent, uniformly medicated as far as possible, and contains from 4 to 6 per cent. of chloramine. It should be **packed** in sealed packets, doubly wrapped, and stored in a cool place.

Standard.—Chloramine gauze contains not less than 4 per cent. and not more than 6 per cent. of $C_7H_7O_2NClSNa,3H_2O$.

Assay.—Place in a stoppered bottle a quantity of gauze equivalent to about 0·25 square yard in area, accurately weighed, with 100 millilitres of water, and shake well; add 20 millilitres of solution of potassium iodide, mix, and add 5 millilitres of dilute sulphuric acid. Shake, allow to stand for ten minutes, and titrate the liberated iodine with N/10 sodium thiosulphate; each millilitre of N/10 sodium thiosulphate is equivalent to 0·01408 gramme of $C_7H_7O_2NClSNa,3H_2O$.

CARBASUS EUFLAVINÆ
(Carbas. Euflavin.)

Euflavine Gauze

Euflavine gauze is absorbent gauze impregnated with euflavine, and may be prepared by immersing absorbent gauze in a sufficient quantity of a solution of euflavine, removing the material from the solution, and pressing sufficiently to produce a gauze which, when dried, is absorbent, uniformly medicated as far as possible, and contains about 0·1 per cent. of euflavine. It should be **packed** in sealed packets, doubly wrapped.

CARBASUS HYDRARGYRI ET ZINCI CYANIDI
(Carbas. Hydrarg. et Zinc. Cyanid.)

Mercury and Zinc Cyanide Gauze

Synonym—Double Cyanide Gauze.

Mercury and zinc cyanide gauze is absorbent gauze impregnated with mercury and zinc cyanide, and may be prepared by immersing absorbent gauze in a suspension of mercury and zinc cyanide in water. The suspension is made by mixing cold solutions of zinc potassium cyanide and mercuric chloride, washing the precipitate till the washings are nearly free from mercury, and diffusing the precipitate in water tinted with a suitable purple dye and containing about 1 per cent. of glycerin. The absorbent gauze is placed in the mixture and, by pressing and agitating, the insoluble medicament is uniformly diffused over the gauze, which is then dried. Mercury and zinc cyanide ribbon gauze, from ½ inch to 2 inches in width, may be prepared in the same manner from absorbent ribbon gauze. Mercury and zinc cyanide gauze is not

so absorbent as other medicated gauzes, even when prepared with absorbent gauze of high absorbency. It should be **packed** in sealed packets, doubly wrapped.

Standard.—Mercury and zinc cyanide gauze contains mercury, equivalent to not less than 0·5 per cent. and not more than 1·5 per cent. of $Hg(CN)_2$, and zinc, equivalent to not less than 1·5 per cent. and not more than 3 per cent. of $Zn(CN)_2$.

Assay.—Place in a beaker a quantity of gauze equivalent to from 0·5 to 1 square yard in area, accurately weighed, with sufficient water to moisten it thoroughly, and add 30 millilitres of nitric acid. Stir thoroughly, and pour off the solution into a large beaker, pressing out as much liquid as possible from the gauze. Wash the gauze with successive quantities of water and add the washings to the solution. Continue washing until the gauze is free from acid (usually 300 to 400 millilitres is required). Filter, and evaporate to a volume of about 100 millilitres; transfer to a 150 millilitre flask, cool, and adjust the volume to 150 millilitres.

For zinc.—Neutralise 50 millilitres of the solution with dilute solution of ammonia and add 1 drop of dilute nitric acid. Add 15 millilitres of mercuric ammonium thiocyanate solution, and complete the assay by the process of the British Pharmacopœia for Zinci Sulphas; each millilitre of M/5 potassium iodate is equivalent to 0·003913 gramme of $Zn(CN)_2$.

For mercury.—Wash the remaining 100 millilitres of the solution into a flask with small quantities of water, neutralise with dilute solution of ammonia, make slightly acid with hydrochloric acid and pass in hydrogen sulphide until precipitation is complete; collect the precipitate, wash it with hydrogen sulphide solution until free from acid, then with alcohol and then with carbon disulphide, and dry at 110°; each gramme of residue is equivalent to 1·0858 grammes of $Hg(CN)_2$.

CARBASUS HYDRARGYRI PERCHLORIDI

(Carbas. Hydrarg. Perchlor.)

Mercuric Chloride Gauze

Synonym—Sublimate Gauze.

Mercuric chloride gauze is absorbent gauze impregnated with mercuric chloride, and may be prepared by immersing absorbent gauze in a sufficient quantity of a solution of mercuric chloride, removing the material from the solution, and pressing sufficiently to produce a gauze which is absorbent, uniformly medicated as far as possible, and contains, when freshly prepared, about 0·1 per cent. of mercuric chloride. The gauze is liable to considerable variation in strength. It should be **packed** in sealed packets, doubly wrapped.

CARBASUS IODOFORMI
(Carbas. Iodof.)

Iodoform Gauze

Iodoform gauze is absorbent gauze impregnated with iodoform, and may be prepared by immersing absorbent gauze under pressure in ether containing sufficient iodoform to produce a gauze which is absorbent and contains about 5 per cent. of iodoform. When the whole of the liquid is absorbed, and the material uniformly medicated as far as possible, the gauze is removed and the ether allowed to evaporate. No dye must be used in its manufacture. A similar gauze containing about 10 per cent. of iodoform is also prepared, and also a moist gauze prepared with glycerin and containing about 10 per cent. of iodoform. Iodoform ribbon gauze, from $\frac{1}{4}$ inch to 2 inches in width, may be prepared in the same manner from absorbent ribbon gauze. Iodoform gauze should be **packed** in sealed packets, wrapped in transparent cellulose tissue and dark paper externally, and stored in a cool place.

Standard.—Iodoform gauze contains not less than 4 per cent. and not more than 6 per cent. of CHI_3.

Assay.—Extract a quantity of gauze equivalent to about 0·25 square yard in area, accurately weighed, with sufficient alcohol to produce 100 millilitres, and determine the iodoform in the solution by the process of the British Pharmacopœia for Iodoformum.

CARBASUS PHENOLIS
(Carbas. Phenol.)

Phenol Gauze

Synonym—Carbolic Gauze.

Phenol gauze is absorbent gauze impregnated with phenol, and may be prepared by immersing absorbent gauze in a sufficient quantity of a solution of phenol in alcohol, removing the material from the solution, and pressing sufficiently to produce a gauze which is absorbent, and contains, when freshly prepared, from 1 to 3 per cent. of phenol. This gauze rapidly loses phenol even when stored under the most favourable conditions, the addition of glycerin being of no value in reducing the rate at which the phenol volatilises. It should be **packed** in sealed packets, doubly wrapped, and stored in a cool place.

In making this preparation the alcohol may be replaced by industrial methylated spirit, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

CARBASUS TRINITROPHENOLIS
(Carbas. Trinitrophen.)
Trinitrophenol Gauze

Synonyms—Picric Gauze; Picric Acid Gauze.

Trinitrophenol gauze is absorbent gauze impregnated with trinitrophenol, and may be prepared by immersing absorbent gauze in a sufficient quantity of a solution of trinitrophenol in distilled water to produce a gauze which is absorbent, uniformly medicated as far as possible, and contains from 1·5 to 2·5 per cent. of trinitrophenol. No dye must be used in its manufacture. It should be **packed** in sealed packets, doubly wrapped.

Standard.—Trinitrophenol gauze contains not less than 1·5 per cent. and not more than 2·5 per cent. of $C_6H_3O_7N_3$.

Assay.—Place in a stoppered bottle a quantity of gauze equivalent to about 0·25 square yard in area, accurately weighed. Add 100 millilitres of freshly boiled water, shake, and titrate with N/10 sodium hydroxide, using phenolphthalein as indicator; each millilitre of N/10 sodium hydroxide is equivalent to 0·0229 gramme of $C_6H_3O_7N_3$.

CELLULOSUM LIGNI
(Cellulos. Lig.)
Cellulose Wadding

Cellulose wadding is made entirely from high-grade, bleached sulphite pulp, which consists of delignified and disintegrated timber; the fibres of the pulp show the characters of the elements of the timber, usually pine, from which it has been prepared, and give no red or pink colouration with a 1 per cent. alcoholic solution of phloroglucinol followed by hydrochloric acid (distinction from lignified tissue); they give a blue colour with N/50 iodine followed by sulphuric acid, 80 per cent. v/v in water. It should be **stored** in a dry place.

Standard.—Cellulose wadding has a superficial area of not less than 1500 square inches per pound. Moisture, not more than 10 per cent. Ash, not more than 0·5 per cent. It yields to chloroform, by continuous extraction, not more than 1 per cent. of extractive. 1·5 grammes of the material, compressed to a volume of about 20 millilitres and placed lightly by means of a forceps on the surface of water at about 20°, sinks or becomes saturated within five seconds.

CHARTA OLEATA
(Chart. Oleat.)
Oiled Paper

Oiled paper consists of cream or white paper made completely

waterproof by treatment with a suitable drying oil. The paper before oiling should contain not more than 40 per cent. of mechanical wood pulp, and not more than 12 per cent. of mineral matter, and should have a weight of about 30 pounds per ream of 500 sheets measuring 20 by 30 inches.

CORCHORUS
(Corchor.)

Jute

Jute consists of the strands of phloem fibres removed from the bark of the stem of *Corchorus olitorus* Linn., *C. capsularis* Linn. and other species of *Corchorus* (Fam. Tiliaceæ), cultivated chiefly in Bengal. It is obtained by retting the stems in water and beating out the fibre. It is pale buff or silvery-grey in tint, the strands having a length of about 1 to 3 metres and a thickness of from 30 to 140 microns, mostly about 80 microns at the middle point. The individual fibres are about 0·8 to 4, or sometimes 5, millimetres long and from 10 to 25 microns wide; the ends are sometimes bluntly pointed and thick-walled, but mostly rounded or even somewhat spathulate; the fibre is smooth, without striations or transverse lines; the lumen varies in diameter, showing contraction at points where the thickness of the wall is correspondingly greater, and here and there being obliterated; the wall responds to the tests for lignin. Jute is supplied on a basis of correct condition weight on a standard moisture regain of 13·75 per cent.

EMPLASTRUM ADHESIVUM
(Emp. Adhesiv.)

Rubber Adhesive Plaster

Rubber adhesive plaster consists of bleached cotton cloth of plain weave, in one continuous length and containing no joins, and spread evenly with a plain, brown, rubber adhesive compound of commerce prepared with the best Pará rubber, and containing not more than 25 per cent. of fillers.

Standard.—Rubber adhesive plaster weighs not less than 8 ounces per square yard. Weight of the base cloth, after removal of the adhesive compound and other foreign matter, and correcting for the natural moisture regain, not less than 4 ounces per square yard. The difference between the weight per square yard of the rubber adhesive plaster and the weight of the base cloth is not less than 4 ounces. The cotton cloth is composed of yarns of good uniform grade, and the material is well-bleached to a good white, clean, and free from leaf and shell. Average number of threads per inch, not less than 75 in the warp and not less than 75 in the weft.

EMPLASTRUM ZINCI OXIDI
(Emp. Zinc. Oxid.)
Zinc Oxide Plaster

Zinc oxide plaster consists of bleached cotton cloth of plain weave, in one continuous length and containing no joins, and spread evenly with a rubber adhesive compound of commerce prepared with the best Pará rubber, and containing not less than 20 per cent. of zinc oxide.

Standard.—Zinc oxide plaster weighs not less than 8 ounces per square yard. Weight of the base cloth, after removal of the adhesive compound and other foreign matter, and correcting for the natural moisture regain, not less than 4 ounces per square yard. The difference between the weight per square yard of the plaster and the weight of the base cloth is not less than 4 ounces. The cotton cloth complies with the standard for the cotton cloth described under Emplastrum Adhesivum.

GOSSYPIUM ABSORBENS
(Gossyp. Absorb.)
Absorbent Cotton Wool

Synonyms—Absorbent Cotton; Absorbent Wool.

Absorbent cotton wool is prepared from cotton, which consists of the epidermal trichomes of the seeds of *Gossypium herbaceum* Linn. (Fam. Malvaceæ) and other cultivated species of *Gossypium*. The seeds are removed mechanically, and the trichomes freed from fatty matter by treatment with alkali; this is followed by bleaching with chlorinated lime or soda and, after washing, the trichomes are mechanically loosened and separated to form a fleecy mass of soft, white filaments. Each filament consists of a single cell about 2 to 4 centimetres long and 15 to 20 microns wide, forming a flattened, tubular band with slightly thickened, rounded edges, and showing from about 50 to 120 twists per centimetre. The apex of the filament is rounded and often solid. In ammoniacal solution of copper oxide it swells uniformly, without the formation of globular enlargements, and finally dissolves with the exception of the contents of the lumen. It is insoluble in 4·5 per cent. w/v sodium hydroxide solution and is not coloured by a saturated aqueous solution of trinitrophenol. It is soluble in a mixture of 38 volumes of sulphuric acid with 17 volumes of water. Absorbent cotton wool absorbs water readily, but its absorbency may be reduced considerably by medication, the degree of absorbency of the product depending upon the nature of the medicament incorporated. It should be **packed** in sealed packets.

Standard.—Absorbent cotton wool is composed of well-carded, cotton fibres, well-bleached to a good white, free from pieces of

thread, and reasonably free from leaf, shell, fibre, dust and foreign matter. The quality and material is the same throughout, and it offers appreciable resistance when pulled. A thin layer of absorbent cotton wool, equivalent to about 0·5 gramme for an area of 70 square inches, placed between two glass plates and viewed by transmitted light, is not more neppy than the standard sample kept by the Manchester Testing House. 1 gramme of the material compressed to a volume of about 20 millilitres, and placed lightly by means of a forceps on the surface of water at about 20°, sinks or becomes saturated within ten seconds. Average length of staple, not less than $\frac{5}{8}$ inch. Water-soluble extractive, not more than 0·5 per cent. Ash, not more than 0·5 per cent.

GOSSYPIUM ACIDI BORICI

(Gossyp. Acid. Boric.)

Boric Acid Wool

Synonym—Boric Wool.

Boric acid wool is absorbent cotton wool impregnated with boric acid, and may be prepared by immersing absorbent cotton wool in a hot, saturated, aqueous solution of boric acid lightly tinted pink with a suitable dye, removing the sheets to wire trays, allowing to drain, and pressing sufficiently to produce a wool which is absorbent and contains from 15 to 30 per cent. of boric acid. It should be **packed** in sealed packets, doubly wrapped.

Standard.—Boric acid wool, determined by the method for Carbasus Acidi Borici, using about 5 grammes, accurately weighed, contains not less than 15 per cent. and not more than 30 per cent. of H_3BO_3.

GOSSYPIUM CAPSICI

(Gossyp. Capsic.)

Capsicum Wool

Capsicum wool is absorbent cotton wool impregnated with oleoresin of capsicum, and may be prepared by compressing absorbent cotton wool, and pouring over it a solution of oleoresin of capsicum in alcohol tinted orange-brown with a suitable dye. A solution of 20 grammes of oleoresin in 700 millilitres of alcohol should be used for 900 grammes of wool. It should be **packed** in sealed packets, doubly wrapped.

In making this preparation the alcohol may be replaced by industrial methylated spirit, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

JACONETTUM
(Jacon.)
Jaconet

Jaconet consists of a bleached cotton fabric of plain weave, evenly proofed with rubber on one side so that the material is impervious to water. The surface is non-adhesive. It is "heat vulcanised" and not "cold cured," free from resins and acidity, and does not become acid when stored. Pink jaconet is jaconet coloured with a suitable dye.

Standard.—Jaconet, when boiled with water for thirty minutes, or when subjected to steam in a steriliser for twenty minutes at a pressure of 15 pounds per square inch, does not become sticky or show any appreciable deterioration. Weight per square yard, not less than 6 ounces. Weight of the fabric per square yard, after the removal of the proofing and other foreign matter, and correcting for the natural moisture regain, not less than 2 ounces. The difference between the weight per square yard of the jaconet and the weight of the fabric is not less than 4 ounces. Average number of threads per inch, not less than 104 in the warp and not less than 72 in the weft. The component yarns are of good uniform grade, and the material is reasonably free from weaving defects.

LANA
(Lan.)
Wool

Synonym—Animal Wool.

Wool is prepared from the fleece of the sheep, *Ovis aries* Linn. (Order Ungulata). The fleece is subjected to cleansing and washing to remove wool-grease and foreign substances. Wool consists of sub-cylindrical, solid hairs, about 15 to 60 microns in width. Each hair is composed of a cuticle of imbricated, flattened, epithelial scales, a wide cortex of nucleated, spindle-shaped fibres, and a narrow medulla of polyhedral or rounded cells. The free projecting edges of the epithelial scales are directed towards the apex of the hair, and give rise to numerous irregular, transverse markings upon the surface of the hair. It is soluble in a 4·5 per cent. w/v sodium hydroxide solution at 100°; insoluble in, but coloured blue by, ammoniacal solution of copper oxide; insoluble at ordinary temperatures in a cold mixture of 38 volumes of sulphuric acid with 17 volumes of water. It is stained yellow by a saturated aqueous solution of trinitrophenol. The proportion of wool in mixtures of wool and cotton is determined quantitatively by the process described on page 1136.

LIGAMENTUM CALCII SULPHATIS
(Ligament. Calc. Sulph.)
Plaster of Paris Bandage

Plaster of Paris bandage consists of bleached cotton cloth of plain weave in one continuous length and containing no joins, impregnated with exsiccated calcium sulphate and suitable adhesives. The exsiccated calcium sulphate is incorporated with the fabric so that at least 75 per cent. of the total weight of the bandage is exsiccated calcium sulphate adherent to the fabric, and the bandage is reasonably free from loose powder. The bandage should be **packed** in a sealed container and **stored** in a dry place.

Standard.—Plaster of Paris bandage measuring 2 inches by 4 yards weighs not less than 2·5 ounces, and the fabric, after removal of the exsiccated calcium sulphate and other foreign matter, weighs not less than 85 grains; the weights of bandages of other widths and lengths are in proportion. Average number of threads per inch, not less than 33 in the warp and not less than 19 in the weft.

LIGAMENTUM CRISPI
(Ligament. Crisp.)
Crêpe Bandage

Crêpe bandage consists of characteristic fabric of plain weave, in one continuous length and containing no joins, in which the warp threads are of cotton and wool, and the weft threads are entirely of cotton.

Standard.—Crêpe bandage is composed of yarns of a good uniform grade, and the material is clean, free from added foreign matter, and reasonably free from weaving defects. It measures, when fully extended, not less than twice the normal length, the normal length being the length of the unstretched bandage. After being held fully extended for one minute, it returns after lightly shaking for a few seconds to not more than two-thirds of the fully-extended length. The bandage contains not less than 33·3 per cent. by weight of wool, all of which is in the warp. A bandage 3 inches wide, the width being that portion between the fast edges of the unstretched bandage, contains in the warp not less than 47 cotton threads and 94 wool threads and, in addition, 2 two-fold cotton binding threads at each edge, and the number of cotton and wool threads in bandages of other widths are in proportion. The warp threads are arranged as follows:—1 two-fold cotton thread (right twist), 2 wool threads, 1 two-fold cotton thread (reverse twist), 2 wool threads. Count of the wool, not coarser than 25's and not finer than 30's (worsted count). The warp threads are made of two-fold cotton yarn with a finished count, after doubling, not

finer than two-fold 20's, and containing not fewer than 54 folded turns per inch. The weft consists of cotton which is 20's count, and the weft threads number not less than 25 per inch when the bandage is fully stretched. Weight of a bandage 3 inches in width, not less than 617 grains per 5 yards (fully stretched), the weights of bandages of other widths and lengths being in proportion.

LIGAMENTUM DOMETTÆ
(Ligament. Domett.)

Domette Bandage

Domette bandage consists of a union fabric of plain weave, in one continuous length and containing no joins, in which the warp yarns are of cotton and the weft yarns entirely of wool.

Standard.—Domette bandage is composed of yarns of a good medium, uniform grade, and the material is clean. The edges are evenly cut, parallel with the warp threads, and are reasonably free from loose threads. Proportion of wool, not less than 66·6 per cent. Foreign matter, not more than 2 per cent. Weight of the bandage, not less than 440 grains per 2 inches by 6 yards, the weights of bandages of other widths and lengths being in proportion. Average number of threads per inch, not less than 40 in the warp and not less than 22 in the weft, the total number of threads per square inch being not less than 65.

LIGAMENTUM ELASTICUM ADHESIVUM
(Ligament. Elast. Adhesiv.)

Elastic Adhesive Bandage

Elastic adhesive bandage consists of elastic cotton fabric, spread evenly with a rubber adhesive compound of commerce prepared with the best Pará rubber, and containing not less than 20 per cent. of zinc oxide. It should be packed in sealed containers and **stored** in a cool place.

Standard.—Elastic adhesive bandage measuring 3 inches by 5 yards, when fully stretched, contains not less than 2 ounces of the rubber adhesive compound, and the weights of the adhesive compound on bandages of other widths and lengths are in proportion. The fabric of each bandage measuring 3 inches by 5 yards, when fully stretched, after the rubber adhesive compound and other foreign matter have been completely removed and correction has been made for the natural moisture regain, weighs not less than 1·75 ounces, and the weights of bandages of other widths and lengths are

in proportion. The elasticity is such that, upon immediate release after being fully stretched, the bandage returns to a length not exceeding 80 per cent. of the length when fully stretched. The warp of the fabric, determined by ascertaining the total number of warp threads in the bandage and dividing this number by the width of the unstretched bandage in inches, contains not fewer than 44 threads per inch. The warp threads are made of two-fold cotton yarn with a finished count, after doubling, not finer than two-fold 26's, and containing not fewer than 44 folded turns per inch, and are woven two ends right twist and two ends reverse twist. The weft of the fabric has not fewer than 20 threads per inch when the bandage is fully stretched, and the threads are of cotton yarn of a count not finer than 8·5's.

LIGAMENTUM LANULÆ
(Ligament. Lanul.)

Flannel Bandage

Flannel bandage consists of a raised fabric of plain weave, made entirely of wool, in one continuous length and containing no joins.

Standard.—Flannel bandage is composed of yarns of a good uniform grade, and the material is clean and reasonably free from weaving defects. The edges are evenly cut, parallel with the warp threads, and are reasonably free from loose threads. Foreign matter, not more than 3 per cent. Weight of the bandage, not less than 900 grains per 2 inches by 6 yards, the weights of bandages of other widths and lengths being in proportion. Average number of threads per inch, not less than 26 in the warp and not less than 28 in the weft.

LIGAMENTUM LINÆ
(Ligament. Lin.)

Bleached Calico Bandage

Bleached calico bandage consists of bleached cotton cloth of plain weave, in one continuous length and containing no joins.

Standard.—Bleached calico bandage is composed of yarns of a good medium grade, and the material is well-bleached to a good white, clean and reasonably free from leaf and shell. The edges are evenly cut, parallel with the warp threads, and are reasonably free from loose threads. Foreign matter, not more than 1·5 per cent. Weight of the bandage, not less than 210 grains per 2 inches by 4 yards, the weights of bandages of other widths and lengths being in proportion. Average number of threads per inch, not less than 67 in the warp and not less than 58 in the weft.

LIGAMENTUM LINÆ CRUDÆ
(Ligament. Lin. Crud.)

Unbleached Calico Bandage

Unbleached calico bandage consists of unbleached cotton cloth of plain weave, in one continuous length and containing no joins.

Standard.—Unbleached calico bandage is composed of yarns of a good medium grade, and the material is clean and reasonably free from leaf and shell. The edges are evenly cut, parallel with the warp threads, and are reasonably free from loose threads. Foreign matter, not more than 10 per cent. Weight of the bandage, not less than 250 grains per 2 inches by 4 yards, the weights of bandages of other widths and lengths being in proportion. Average number of threads per inch, not less than 65 in the warp and not less than 60 in the weft.

LIGAMENTUM PASTÆ ZINCI
(Ligament. Past. Zinc.)

Zinc Paste Bandage

Zinc paste bandage consists of white, open-wove, cotton fabric, impregnated with a paste of the following composition:—Zinc oxide, 17 parts, glycerin, 17 parts (by weight), sterilised refined glue, 6·5 parts, acacia, 8·5 parts, benzoic acid, 0·5 part, distilled water, sufficient to produce 100 parts (by weight). The weight of paste used for a bandage measuring 4 inches by 7 yards is 4 ounces, and the weights for bandages of other widths and lengths are in proportion. The bandage should be wrapped in grease-proof paper and **packed** in a sealed container.

Standard.—The warp of the fabric is of cotton yarn of a count not finer than 40's and not heavier than 30's, and the threads, per inch, not less than 30 and not more than 35. The weft of the fabric is of cotton yarn of a count not finer than 26's and not heavier than 16's, and the threads, per inch, not less than 20 and not more than 25.

LIGAMENTUM SINDONIS
(Ligament. Sindon.)

Muslin Bandage

Synonym—Bleached Muslin Bandage.

Muslin bandage consists of cotton cloth of plain weave, known in commerce as butter cloth material, in one continuous length and containing no joins.

Standard.—Muslin bandage is composed of yarns of a good medium, uniform grade, and the material is well-bleached to a good white, clean and reasonably free from leaf and shell. The edges are evenly cut, parallel with the warp threads, and are reasonably free from loose threads. Foreign matter, not more than 1·5 per cent. Weight of the bandage, not less than 190 grains per 2·5 inches by 6 yards, the weights of bandages of other widths and lengths being in proportion. Average number of threads per inch, not less than 48 in the warp and not less than 30 in the weft.

LIGAMENTUM TEXTUM APERTUM
(Ligament. Text. Apert.)

Open-Wove Bandage

Synonym—White Open-Wove Bandage.

Open-wove bandage consists of cotton cloth of plain weave, in one continuous length and containing no joins.

Standard.—Open-wove bandage is composed of yarns of a good medium, uniform grade, and the material is well-bleached to a good white, clean and reasonably free from leaf and shell. The edges are evenly cut, parallel with the warp threads, and are reasonably free from loose threads. Foreign matter, not more than 1·5 per cent. Weight of the bandage, not less than 200 grains per 2 inches by 4 yards, the weights of bandages of other widths and lengths being in proportion. Average number of threads per inch, not less than 43 in the warp and not less than 27 in the weft. Bleached count of the warp yarn, not finer than 40's and not heavier than 33's.

LINTEUM ABSORBENS
(Lint. Absorb.)

Absorbent Lint

Synonyms—Lint; Cotton Lint; Unmedicated Lint.

Absorbent lint is a cotton cloth of plain weave, from the warp yarns of which a nap has been raised. It absorbs water readily, but its absorbency may be reduced considerably by medication, the degree of absorbency of the product depending upon the nature of the medicament incorporated. It should be **packed** in sealed packets.

Standard.—Absorbent lint is reasonably free from weaving defects, well-raised, readily tearable in both directions, and bleached to a good white. The component yarns are reasonably free from slubs, snarls and other defects causing lumps in the cloth, and the raised side of the

fabric is reasonably free from neps. It is clean and reasonably free from leaf, shell and other foreign substance. Water-soluble extractive, not more than 0·5 per cent. Superficial area, not less than 230 and not more than 250 square inches per ounce. Average number of threads per inch, not less than 39 in the warp and not less than 24 in the weft. A piece of the material measuring 3 inches by 3 inches, lightly placed by means of forceps, unraised side downwards, on the surface of water at about 20°, becomes saturated within ten seconds.

LINTEUM ACIDI BORICI
(Lint. Acid. Boric.)
Boric Acid Lint

Synonyms—Boric Lint; Boracic Lint.

Boric acid lint is absorbent lint impregnated with boric acid, and may be prepared by immersing absorbent lint in a saturated solution of boric acid in boiling distilled water tinted pink with a suitable dye, removing the material from the solution and pressing sufficiently to produce a lint, uniformly medicated as far as possible, and containing not less than 35 and not more than 45 per cent. of boric acid. It should be **packed** in sealed packets.

Standard.—Boric acid lint, determined by the method for Carbasus Acidi Borici, using about 1 gramme, accurately weighed, contains not less than 35 per cent. and not more than 45 per cent. of H_3BO_3. A piece of the material measuring 3 inches by 3 inches, placed lightly by means of forceps, unraised side downwards, on the surface of water at about 20°, becomes saturated within twelve seconds.

SERICUM
(Seric.)
Silk

Silk is the prepared fibre from the cocoons of *Bombyx mori* Linn. and other species of *Bombyx*, and of *Antheræa mylitta* Drury and other species of *Antheræa* (Order Lepidoptera). The fibre is unwound from the cocoons and submitted to a degumming process. The single threads are about 5 to 65 microns thick, and are rounded or rounded triangular in transverse section, externally smooth or finely-striated longitudinally, occasionally somewhat flattened or twisted round one another. The threads are hyaline, homogeneous and solid; they are coloured light brown by solution of iodine; they dissolve slowly in warm 5 per cent. w/v solution of potassium hydroxide, and are coloured red by warming with Millon's reagent. Silk burns slowly, with an odour resembling burnt horn, the vapours evolved having an alkaline reaction. Raw silk is supplied on a basis of correct condition-weight on a standard moisture regain of 11 per cent.

SERICUM OLEATUM
(Seric. Oleat.)
Oiled Silk

Oiled silk consists of silk fabric made completely waterproof by treatment with a suitable drying oil, without added colour, or coloured with a suitable green dye. It should be **stored** in a cool place.

Standard.—Oiled silk is composed of pure silk fabric of plain weave, regularly woven and reasonably free from weaving defects. Weight of the oiled fabric, not less than 2·5 ounces and not more than 3·5 ounces per square yard. Weight of the silk fabric, after removal of the waterproofing material and other foreign matter and after correction has been made for the natural moisture regain, not less than 0·33 ounce per square yard. Average number of threads per inch, not less than 120 in the warp and not less than 85 in the weft.

SINDON OLEATA
(Sind. Oleat.)
Oiled Cambric

Synonym—Yellow Oiled Cambric.

Oiled cambric consists of cotton cloth of plain weave, known as bleached cambric, made completely waterproof with a suitable drying oil, and treated to prevent sticking. It should be **stored** in a cool place, preferably on a roller kept in an upright position.

Standard.—Oiled cambric is composed of yarns of good uniform grade, and the material is reasonably free from weaving defects. Weight of the oiled fabric, not less than 4 ounces per square yard. Weight of the cotton fabric, after removal of the waterproofing material and other foreign matter and after correction has been made for the natural moisure regain, not less than 1·5 ounces per square yard. The difference between the weight per square yard of the oiled fabric and the weight of the cotton fabric is not less than 2·5 ounces. Average number of threads per inch, not less than 74 in the warp and not less than 68 in the weft.

STUPA
(Stup.)
Tow

Synonym—Unmedicated Tow.

Tow consists of jute fibre of good average quality, in cheese rolls. When kept it may lose moisture and become brittle and dusty, and should be **stored** in a cool atmosphere.

Standard.—Tow is yellowish-brown in colour, and free from woody tissue, described as "root." Moisture, not more than 13 per cent.

STUPA PHENOLIS
(Stup. Phenol.)
Phenol Tow

Synonym—Carbolised Tow.

Phenol tow is tow impregnated with phenol, and may be prepared by immersing tow in a sufficient quantity of a solution of phenol in alcohol, removing the material from the solution, and pressing sufficiently to produce a tow containing, when dried and freshly prepared, about 5 per cent. of phenol. This tow rapidly loses phenol even when stored under the most favourable conditions. It should be packed in sealed packets and **stored** in a cool place.

In making this preparation the alcohol may be replaced by industrial methylated spirit, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

TELA CARBASI ET GOSSYPII
(Tel. Carbas. et Gossyp.)
Gauze and Cotton Tissue

Synonym—Absorbent Gauze Tissue.

Gauze and cotton tissue consists of a thick layer of absorbent cotton wool enclosed in tubular, absorbent gauze. The average pound measures 19 to 20 inches by 2·75 yards. The tubular form of the absorbent gauze may not be evident in weights of 2 ounces or under.

Standard.—The absorbent gauze complies with the standard for Carbasus Absorbens, with the exception of the weft, which has not fewer than 12 threads per inch. The absorbent cotton wool complies with the standard for Gossypium Absorbens. Superficial area, not less than 1800 square inches per pound.

TELA CARBASI ET GOSSYPII CAPSICI
(Tel. Carbas. et Gossyp. Capsic.)
Capsicum Tissue

Capsicum tissue consists of a thick layer of capsicum wool enclosed in tubular, absorbent gauze which has been tinted orange-brown with a suitable dye. The tubular form of the absorbent gauze may not be evident in weights of 2 ounces or under. It should be **packed** in sealed packets, doubly wrapped.

Standard.—The absorbent gauze complies with the standard for Carbasus Absorbens, with the exception of the colour and the weft, which has not fewer than 12 threads per inch. Superficial area, not less than 1800 square inches per pound.

TELA CARBASI ET LIGNI

(Tel. Carbas. et Lig.)

Cellulose Tissue

Synonym—Gauze and Cellulose Wadding Tissue.

Cellulose tissue consists of a thick layer of cellulose wadding enclosed in tubular absorbent gauze. The tubular form of the absorbent gauze may not be evident in weights of 2 ounces or under.

Standard.—The absorbent gauze complies with the standard for Carbasus Absorbens, with the exception of the weft, which has not fewer than 12 threads per inch. The cellulose wadding complies with the standard for Cellulosum Ligni. Superficial area, not less than 1350 square inches per pound.

TELA GUTTA PERCHA

(Tel. Gutt. Perch.)

Gutta Percha Tissue

Gutta percha tissue is gutta percha in thin sheets. It should be **stored** in a cool place.

Standard.—Gutta percha tissue has a superficial area of not less than 648 and not more than 730 square inches per ounce.

PART III

FORMULARY

The British Pharmaceutical Codex

PART III

ACETUM CANTHARIDINI
(Acet. Cantharidin.)

Vinegar of Cantharidin

	Metric	*Imperial*
Cantharidin	1 g.	$4\frac{3}{8}$ gr.
Glacial Acetic Acid	200 ml.	2 fl. oz.
Acetic Acid	to 2000 ml.	to 20 fl. oz.

Dissolve the cantharidin in the glacial acetic acid with the aid of gentle heat; cool and add sufficient acetic acid to produce the required volume.

ACETUM CANTHARIDIS
(Acet. Canthar.)

Vinegar of Cantharides

	Metric	*Imperial*
Cantharides	100 g.	2 oz.
Glacial Acetic Acid	a sufficient quantity	
Distilled Water	a sufficient quantity	

Bruise the cantharides and macerate with 900 millilitres (18 fluid ounces) of a mixture of equal volumes of glacial acetic acid and distilled water for twenty-four hours; transfer to a percolator and, when the liquid ceases to pass, pour sufficient of the same menstruum in successive portions over the contents of the percolator to produce 1000 millilitres (20 fluid ounces).

ACETUM IPECACUANHÆ
(Acet. Ipecac.)

Vinegar of Ipecacuanha

	Metric	*Imperial*
Liquid Extract of Ipecacuanha..	50 ml.	1 fl. oz.
Alcohol (90 per cent.)	100 ml.	2 fl. oz.
Dilute Acetic Acid	600 ml.	12 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix, allow to stand for forty-eight hours and filter.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

ACETUM ODORATUM

(Acet. Odorat.)

Toilet Vinegar

	Metric	*Imperial*
Oil of Bergamot	5 ml.	48 m.
Oil of Cassia	1 ml.	10 m.
Oil of Clove	3 ml.	29 m.
Oil of Lavender	2 ml.	19 m.
Oil of Lemon	5 ml.	48 m.
Tincture of Tolu	10 ml.	96 m.
Tincture of Benzoin	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	500 ml.	10 fl. oz.
Acetic Acid	125 ml.	2½ fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the oils, tincture of tolu and tincture of benzoin with the alcohol; add the acetic acid and sufficient distilled water to produce the required volume; shake well, and filter, using purified talc if necessary.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, and the tincture of tolu and tincture of benzoin may be replaced by tinctures of tolu and benzoin prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

Toilet vinegar should be distinguished from aromatic vinegar (see Acidum Aceticum Aromaticum).

ACIDUM ACETICUM AROMATICUM

(Acid. Acet. Aromat.)

Aromatic Acetic Acid

Synonym—Aromatic Vinegar.

	Metric	*Imperial*
Oil of Bergamot	25·0 ml.	½ fl. oz.
Oil of Cinnamon	12·5 ml.	¼ fl. oz.
Oil of Clove	100·0 ml.	2 fl. oz.
Oil of Lavender	50·0 ml.	1 fl. oz.
Oil of Orange	50·0 ml.	1 fl. oz.
Oil of Thyme	25·0 ml.	½ fl. oz.
Glacial Acetic Acid	to 1000·0 ml.	to 20 fl. oz.

Dissolve the oils in about 700 millilitres (14 fluid ounces) of the glacial acetic acid and add sufficient of the acid to produce the required volume.

Aromatic vinegar should be distinguished from toilet vinegar (see Acetum Odoratum).

ACIDUM LACTICUM DILUTUM
(Acid. Lact. Dil.)
Dilute Lactic Acid

	Metric	*Imperial*
Lactic Acid	174·5 g.	2 oz. 346½ gr.
Distilled Water	825·5 g.	13 oz. 91 gr.

Mix.

Standard.—Dilute lactic acid, determined by the method of the British Pharmacopœia for Acidum Lacticum, using about 15 grammes accurately weighed, contains the equivalent of not less than 14·5 per cent. and not more than 17·0 per cent. w/w of $C_3H_6O_3$. It complies with the tests for purity of the British Pharmacopœia for Acidum Lacticum when six times the quantity is taken for each test. Specific gravity, about 1·04.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

ACIDUM NITRICUM DILUTUM
(Acid. Nit. Dil.)
Dilute Nitric Acid

	Metric	*Imperial*
Nitric Acid	143 g.	2 oz. 126 gr.
Distilled Water	857 g.	13 oz. 311½ gr.

Mix.

Standard.—Dilute nitric acid, determined by the method of the British Pharmacopœia for Acidum Nitricum, using about 15 grammes accurately weighed, contains not less than 9·5 per cent. and not more than 10·5 per cent. w/w of HNO_3. It complies with the tests for purity of the British Pharmacopœia for Acidum Nitricum when seven times the quantity is taken for each test. Specific gravity, 1·054 to 1·060

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

ACIDUM NITRO-HYDROCHLORICUM DILUTUM
(Acid. Nitro-hydrochlor. Dil.)
Dilute Nitro-hydrochloric Acid

	Metric	*Imperial*
Nitric Acid	126 g.	2 oz. 7 gr.
Hydrochloric Acid	137 g.	2 oz. 84 gr.
Distilled Water	737 g.	11 oz. 346½ gr.

Mix.

Standard.—Dilute nitro-hydrochloric acid contains nitric and hydrochloric acids and various reaction products of the constituent

acids equivalent to about 12 5 per cent. w/w of nitric acid and about 13·5 per cent. w/w of hydrochloric acid. 10 millilitres requires for neutralisation not less than 25·5 millilitres and not more than 29·0 millilitres of N/1 sodium hydroxide using methyl orange as indicator. Specific gravity, about 1·07.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

ACIDUM SULPHURICUM AROMATICUM

(Acid. Sulph. Aromat.)

Aromatic Sulphuric Acid

Synonym—Elixir of Vitriol.

	Metric	*Imperial*
Tincture of Ginger	250 ml.	5 fl. oz.
Spirit of Cinnamon	15 ml.	144 m.
Sulphuric Acid	70 ml.	1 fl. oz. 192 m.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix the sulphuric acid gradually with 600 millilitres (12 fluid ounces) of the alcohol, and cool; add the spirit of cinnamon, tincture of ginger and sufficient of the alcohol to produce the required volume.

Standard.—Aromatic sulphuric acid contains free and combined sulphuric acid equivalent to not less than 12·2 per cent. and not more than 13·5 per cent. w/v of H_2SO_4. Specific gravity, about 0·920.

Assay.—To 10 millilitres add 50 millilitres of N/1 sodium hydroxide and evaporate the mixture to dryness; dissolve the residue in water and titrate the solution with N/1 sulphuric acid using methyl orange as indicator; each millilitre of N/1 sodium hydroxide absorbed is equivalent to 0·04904 gramme of H_2SO_4.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

ALCOHOL AMMONIATUM

(Alcoh. Ammon.)

Ammoniated Alcohol

Alcohol (90 per cent.)	a sufficient quantity
Strong Solution of Ammonia ..	a sufficient quantity

Warm the strong solution of ammonia and pass the gas evolved into the alcohol. Determine the proportion of ammonia in the liquid and add, if necessary, sufficient of the alcohol to produce a solution of the required strength.

Standard.—Ammoniated alcohol, determined by the method of the British Pharmacopœia for Liquor Ammoniæ Fortis, using about 6

grammes, accurately weighed, contains not less than 9 per cent. and not more than 11 per cent. w/w of NH_3. Specific gravity, about 0·815.

AMPULLÆ

Ampoules

Ampoules are glass containers for solutions or suspensions which are usually intended for injection through the skin. They vary in shape, and their capacities range from 0·5 millilitre (8 minims) to 100 millilitres (3½ fluid ounces). Most frequently they are of a capacity of 1 millilitre (15 minims). Ampoules should be made from glass of high chemical resistance and, when required to contain preparations of alkaloids or other substances such as adrenaline which are readily affected by alkali, they must not change the colour of acid solution of methyl red more than is permitted by the tests for limit of alkalinity of glass described in the British Pharmacopœia. When required for preparations liable to be affected by light, amber-coloured glass should be used. All apparatus used in the preparation of substances to be filled into ampoules, as well as the empty ampoules, should be sterilised by heating at 150° for one hour, or by an equivalent process.

Small numbers of ampoules may be filled conveniently with a hypodermic syringe, or a burette to which is attached a fine, hollow, glass or metal needle; the filled ampoules are sealed in a blow-pipe or bunsen flame. When filled, the ampoules should be sterilised by one of the methods described in Appendix XII. It is advisable to store filled ampoules in the dark at a temperature below 10°. Certain volatile liquids may be introduced into thin-walled ampoules by heating the ampoule, immersing the single drawn out end in the liquid, and allowing the liquid to fill the partial vacuum formed on cooling. Another type of ampoule is made from specially thin-walled tubing and is intended to be crushed and the contents inhaled. Ampoules may also be used as containers for definite quantities of solid substances, such as neoarsphenamine, sodium citrate, sodium bicarbonate or iodophthalein, required for the preparation of sterile solutions. Such solutions should be made by dissolving the substance in sterilised water, and are for immediate use.

AMYLUM SALICYLATUM

(Amylum Salicylat.)

Salicylated Starch

	Metric	*Imperial*
Salicylic Acid, finely sifted ..	100 g.	1 oz.
Starch, finely sifted	900 g.	9 oz.

Mix.

ANTIDOTUM ARSENUM

(Antidot. Arsen.)

Arsenic Antidote

	Metric	*Imperial*
Strong Solution of Ferric Chloride	30 ml.	288 m.
Light Magnesium Oxide ..	10 g.	87½ gr.
Distilled Water	a sufficient quantity	

Mix the strong solution of ferric chloride with 125 millilitres (2½ fluid ounces) of the water, and keep the liquid in a well-stoppered bottle. Triturate the light magnesium oxide with distilled water to form a smooth and thin mixture, dilute this with sufficient distilled water to produce 750 millilitres (15 fluid ounces), and transfer the liquid to a well-stoppered bottle. When the preparation is required for use, shake the magnesium oxide mixture to a homogeneous thin magma and add 112·5 millilitres (3¾ fluid ounces) gradually in a thin stream to 25 millilitres (400 minims) of the iron solution, shaking until a smooth mixture results.

Dose.– 120 millilitres (4 fluid ounces).

AQUÆ

Waters

Unmedicated water of three grades of purity is used in pharmacy—good potable water, distilled water and sterilised distilled water. Potable water may be used in the manufacture of official preparations when distilled water is not specified, but it is unsuitable as a general vehicle in dispensing on account of the presence of dissolved calcium and magnesium salts. These impart an alkaline reaction to the water and produce undesirable changes in the colour of certain vegetable galenicals; they also yield precipitates with many salts.

In the preparation of solutions to be administered by injection, it is necessary to use sterilised water (Aqua Sterilisata) owing to the bacterial contamination of ordinary distilled water. Intravenous injections should be prepared with "sterilised water for intravenous injections" which is not more than twenty-four hours old; for other purposes sterilised water should be used within a month of its distillation.

Aromatic waters are saturated solutions of volatile oils or other aromatic substances in distilled water. Some of them have a mild therapeutic action, but they are mainly used as vehicles for the internal administration of medicaments on account of their flavouring properties. The following general methods are employed in the preparation of aromatic waters when no specific method is described:—

1. Distilled Aromatic Waters.

Distil the drug with the water until the specified volume of distillate

has been collected, shake the distillate thoroughly, allow to stand for twelve hours and separate any excess of oil.

2. Other Aromatic Waters.

(a) Shake the essential oil with five hundred times its volume of distilled water and repeat the shaking at intervals during about fifteen minutes; set aside for twelve hours and filter.

(b) Triturate the oil with a sufficient quantity of calcium phosphate, purified talc, diatomite or pulped filter paper; add gradually five hundred times its volume of distilled water and filter.

(c) Add to the concentrated water thirty-nine times its volume of distilled water and filter if necessary.

AQUA ANISI CONCENTRATA

(Aq. Anis. Conc.)

Concentrated Anise Water

	Metric	*Imperial*
Oil of Anise	20 ml.	192 m.
Alcohol (90 per cent.)	600 ml.	12 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the oil of anise in the alcohol and add sufficient distilled water in successive small quantities to produce the required volume, shaking vigorously after each addition. Add 50 grammes (1 ounce) of purified talc and shake; allow to stand for a few hours, occasionally shaking, and filter.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This concentrated water when diluted with 39 times its volume of distilled water yields a preparation which is approximately equivalent in strength to distilled anise water, but contains 1·5 per cent. v/v of alcohol (90 per cent.).

AQUA ANISI DESTILLATA

(Aq. Anis. Dest.)

Distilled Anise Water

	Metric	*Imperial*
Anise	100 g.	2 oz.
Water	2000 ml.	40 fl. oz.

Distil 1000 millilitres (20 fluid ounces).

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

When anise water (Aqua Anisi) is ordered, distilled anise water not being specified, anise water prepared by any one of the general methods may be dispensed.

AQUA AURANTII FLORIS

(Aq. Aurant. Flor.)

Orange-flower Water

	Metric	*Imperial*
Triple Orange-flower Water ..	250 ml.	5 fl. oz.
Distilled Water	500 ml.	10 fl. oz.

Mix immediately before use.

When orange-flower water (Aqua Aurantii Floris) is ordered, either the above preparation or the concentrated water diluted with 39 times its volume of distilled water may be dispensed.

AQUA AURANTII FLORIS CONCENTRATA

(Aq. Aurant. Flor. Conc.)

Concentrated Orange-flower Water

	Metric	*Imperial*
Oil of Neroli	6 ml.	57½ m.
Alcohol (90 per cent.)	600 ml.	12 fl. oz.
Triple Orange-flower Water	.. to 1000 ml.	to 20 fl. oz.

Dissolve the oil of neroli in the alcohol and add sufficient triple orange-flower water in successive small quantities to produce the required volume, shaking vigorously after each addition. Add 50 grammes (1 ounce) of purified talc and shake; allow to stand for a few hours, occasionally shaking, and filter.

This concentrated water when diluted with 39 times its volume of distilled water yields a preparation which is approximately equivalent in strength to orange-flower water, but contains 1·5 per cent. v/v of alcohol (90 per cent.).

AQUA AURANTII FLORIS TRIPLEX

(Aq. Aurant. Flor. Trip.)

Triple Orange-flower Water

Triple orange-flower water is the undiluted orange-flower water of commerce prepared by distillation from the fresh flowers of the bitter-orange tree, *Citrus Aurantium* Linn. subsp. *amara* Engl. (Fam. Rutaceæ). It is a saturated aqueous solution of the volatile oil.

AQUA CAMPHORÆ CONCENTRATA

(Aq. Camph. Conc.)

Concentrated Camphor Water

	Metric	*Imperial*
Camphor	40 g.	350 gr.
Alcohol (90 per cent.)	600 ml.	12 fl. oz.
Distilled Water	.. to 1000 ml.	to 20 fl. oz.

Dissolve the camphor in the alcohol and add sufficient distilled water in successive small quantities to produce the required volume, shaking vigorously after each addition.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This concentrated water when diluted with 39 times its volume of distilled water yields a preparation which is equivalent in strength to camphor water, but contains 1·5 per cent. v/v of alcohol (90 per cent.).

AQUA CARI CONCENTRATA

(Aq. Cari Conc.)

Concentrated Caraway Water

	Metric	*Imperial*
Oil of Caraway	20 ml.	192 m.
Alcohol (90 per cent.)	600 ml.	12 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the oil of caraway in the alcohol and add sufficient distilled water in successive small quantities to produce the required volume, shaking vigorously after each addition. Add 50 grammes (1 ounce) of purified talc and shake; allow to stand for a few hours, occasionally shaking, and filter.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This concentrated water when diluted with 39 times its volume of distilled water yields a preparation which is approximately equivalent in strength to distilled caraway water, but contains 1·5 per cent. v/v of alcohol (90 per cent.).

AQUA CARI DESTILLATA

(Aq. Cari Dest.)

Distilled Caraway Water

	Metric	*Imperial*
Caraway	100 g.	2 oz.
Water	2000 ml.	40 fl. oz.

Distil 1000 millilitres (20 fluid ounces).

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

When caraway water (Aqua Cari or Aqua Carui) is ordered, distilled caraway water not being specified, caraway water prepared by any one of the general methods may be dispensed.

AQUA CARYOPHYLLI CONCENTRATA

(Aq. Caryoph. Conc.)

Concentrated Clove Water

	Metric	*Imperial*
Oil of Clove	20 ml.	192 m.
Alcohol (90 per cent.)	600 ml.	12 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the oil of clove in the alcohol and add sufficient distilled water in successive small quantities to produce the required volume, shaking vigorously after each addition. Add 50 grammes (1 ounce) of purified talc and shake; allow to stand for a few hours, occasionally shaking, and filter.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This concentrated water when diluted with 39 times its volume of distilled water yields a preparation which is approximately equivalent in strength to distilled clove water, but contains 1·5 per cent. v/v of alcohol (90 per cent.).

AQUA CARYOPHYLLI DESTILLATA

(Aq. Caryoph. Dest.)

Distilled Clove Water

	Metric	*Imperial*
Clove	25 g.	½ oz.
Water	2000 ml.	40 fl. oz.

Distil 1000 millilitres (20 fluid ounces) and filter when cold.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

When clove water (Aqua Caryophylli) is ordered, distilled clove water not being specified, clove water prepared by any one of the general methods may be dispensed.

AQUA CHLOROFORMI CONCENTRATA

(Aq. Chlorof. Conc.)

Concentrated Chloroform Water

	Metric	*Imperial*
Chloroform	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	600 ml.	12 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the chloroform in the alcohol and add gradually, with constant shaking, sufficient distilled water to produce the required volume.

Dose.– 0·4 to 0·8 millilitre (6 to 12 minims).

This concentrated water when diluted with 39 times its volume of distilled water yields a preparation which is equivalent in strength to chloroform water, but contains 1·5 per cent. v/v of alcohol (90 per cent.).

AQUA CHLOROFORMI DUPLEX

(Aq. Chlorof. Dup.)

Double Chloroform Water

Synonyms—Aqua Chloroformi Fortior; Stronger Chloroform Water.

	Metric	*Imperial*
Chloroform	5 ml.	48 m.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Shake frequently until solution is effected.

Dose.– 8 to 16 millilitres (2 to 4 fluid drachms).

AQUA FŒNICULI CONCENTRATA

(Aq. Fœnic. Conc.)

Concentrated Fennel Water

	Metric	*Imperial*
Oil of Fennel	20 ml.	192 m.
Alcohol (90 per cent.)	600 ml.	12 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the oil of fennel in the alcohol and add sufficient distilled water in successive small quantities to produce the required volume, shaking vigorously after each addition. Add 50 grammes (1 ounce) of purified talc and shake; allow to stand for a few hours, occasionally shaking, and filter.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This concentrated water when diluted with 39 times its volume of distilled water yields a preparation which is approximately equivalent in strength to distilled fennel water, but contains 1·5 per cent. v/v of alcohol (90 per cent.).

AQUA FŒNICULI DESTILLATA

(Aq. Fœnic. Dest.)

Distilled Fennel Water

	Metric	*Imperial*
Fennel	100 g.	2 oz.
Water	2000 ml.	40 fl. oz.

Distil 1000 millilitres (20 fluid ounces).

Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

When fennel water (Aqua Fœniculi) is ordered, distilled fennel water not being specified, fennel water prepared by any one of the general methods may be dispensed.

AQUA LAUROCERASI
(Aq. Laurocer.)
Cherry-laurel Water

Synonym—Aqua laurocerasi I.A.

	Metric	*Imperial*
Cherry-laurel Leaf	1000 g.	20 oz.
Water	2000 ml.	40 fl. oz.

Dissolve 100 grammes (2 ounces) of sodium chloride in the water, add the crushed leaves and distil 1000 millilitres (20 fluid ounces). Shake the distillate, and filter if necessary. Determine the proportion of hydrocyanic acid in the product and adjust it by adding either hydrocyanic acid or distilled water to produce a cherry-laurel water of the required strength.

Standard.—Cherry-laurel water, determined by the method of the British Pharmacopœia for Acidum Hydrocyanicum Dilutum, contains not less than 0·09 per cent. and not more than 0·11 per cent. w/v of HCN.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

AQUA MELLIS
(Aq. Mel.)
Honey Water

	Metric	*Imperial*
Oil of Bergamot	7·8 ml.	75 m.
Oil of Lavender	2·6 ml.	25 m.
Oil of Clove	2·6 ml.	25 m.
Oil of Sandal Wood	0·5 ml.	5 m.
Grain Musk	0·75 g.	6½ gr.
Saffron	0·38 g.	3½ gr.
Triple Rose Water	150·0 ml.	3 fl. oz.
Triple Orange-flower Water ..	150·0 ml.	3 fl. oz.
Purified Honey	5·0 g.	43¾ gr.
Alcohol (90 per cent.) ..	to 1000·0 ml.	to 20 fl. oz.

Dissolve the oils of bergamot, lavender, clove and sandal wood in 650 millilitres (13 fluid ounces) of the alcohol, add the grain musk and saffron, the honey mixed with the rose and orange-flower waters, and sufficient of the alcohol to produce the required volume. Set aside for seven days and filter, using purified talc or kaolin if necessary.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the final product contains 1 per cent. v/v of ethyl phthalate and that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

AQUA MENTHÆ VIRIDIS CONCENTRATA
(Aq. Menth. Vir. Conc.)
Concentrated Spearmint Water

	Metric	*Imperial*
Oil of Spearmint	20 ml.	192 m.
Alcohol (90 per cent.)	600 ml.	12 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the oil of spearmint in the alcohol and add sufficient distilled water in successive small quantities to produce the required volume, shaking vigorously after each addition. Add 50 grammes (1 ounce) of purified talc and shake; allow to stand for a few hours, occasionally shaking, and filter.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

This concentrated water when diluted with 39 times its volume of distilled water yields a preparation which is approximately equivalent in strength to distilled spearmint water, but contains 1·5 per cent. v/v of alcohol (90 per cent.).

AQUA MENTHÆ VIRIDIS DESTILLATA
(Aq. Menth. Vir. Dest.)
Distilled Spearmint Water

	Metric	*Imperial*
Oil of Spearmint	1 ml.	10 m.
Water	1500 ml.	30 fl. oz.

Distil 1000 millilitres (20 fluid ounces).

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

When spearmint water (Aqua Menthæ Viridis) is ordered, distilled spearmint water not being specified, spearmint water prepared by any one of the general methods may be dispensed.

AQUA MENTHOLIS
(Aq. Menthol.)
Menthol Water

	Metric	*Imperial*
Menthol	1·1 g.	10 gr.
Alcohol (90 per cent.)	1·7 ml.	15 m.
Distilled Water	1000·0 ml.	20 fl. oz.

Dissolve the menthol in the alcohol, add the solution to the water, shake well, and filter after twenty-four hours.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

AQUA PIMENTÆ CONCENTRATA
(Aq. Piment. Conc.)

Concentrated Pimento Water

	Metric	*Imperial*
Oil of Pimento	20 ml.	192 m.
Alcohol (90 per cent.)	600 ml.	12 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the oil of pimento in the alcohol and add sufficient distilled water in successive small quantities to produce the required volume, shaking vigorously after each addition. Add 50 grammes (1 ounce) of purified talc and shake; allow to stand for a few hours, occasionally shaking, and filter.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

When pimento water (Aqua Pimentæ) is ordered, this preparation diluted with 39 times its volume of distilled water may be dispensed.

AQUA ROSÆ
(Aq. Ros.)

Rose Water

	Metric	*Imperial*
Triple Rose Water	250 ml.	5 fl. oz.
Distilled Water	500 ml.	10 fl. oz.

Mix immediately before use.

When rose water (Aqua Rosæ) is ordered, either the above preparation or the concentrated water diluted with 39 times its volume of distilled water, may be dispensed.

AQUA ROSÆ CONCENTRATA
(Aq. Ros. Conc.)

Concentrated Rose Water

	Metric	*Imperial*
Oil of Rose	10 ml.	96 m.
Alcohol (90 per cent.)	500 ml.	10 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the oil of rose in the alcohol and add sufficient distilled water in successive small quantities to produce the required volume, shaking vigorously after each addition. Add 50 grammes (1 ounce) of purified talc and shake; allow to stand for a few hours, occasionally shaking, and filter.

This concentrated water when diluted with 39 times its volume of distilled water yields a preparation which is approximately equivalent in strength to rose water, but contains 1·25 per cent. of alcohol (90 per cent.).

AQUA ROSÆ TRIPLEX
(Aq. Ros. Trip.)
Triple Rose Water

Triple rose water is the undiluted rose water of commerce, prepared by distillation from the fresh flowers of *Rosa damascena* Linn. (Fam. Rosaceæ). It is a saturated aqueous solution of the volatile oil.

AQUA SAMBUCI
(Aq. Sambuc.)
Elder-flower Water

	Metric	*Imperial*
Triple Elder-flower Water ..	250 ml.	5 fl. oz.
Distilled Water	500 ml.	10 fl. oz.

Mix immediately before use.

AQUA SAMBUCI TRIPLEX
(Aq. Sambuc. Trip.)
Triple Elder-flower Water

Triple elder-flower water is the undiluted elder-flower water of commerce, prepared by distillation from the fresh flowers of *Sambucus nigra* Linn. (Fam. Caprifoliacæ). It is a saturated aqueous solution of the volatile oil.

ARGENTI NITRAS MITIGATUS
(Argent. Nit. Mitig.)
Mitigated Silver Nitrate

Synonyms—Mitigated Caustic; Argenti Nitras Dilutus.

	Metric	*Imperial*
Silver Nitrate	20 g.	1 oz.
Potassium Nitrate	40 g.	2 oz.

Fuse together, mix, and pour into suitable moulds.
It should be **stored** protected from light.

Standard.—Mitigated silver nitrate, determined by the method of the British Pharmacopœia for Argenti Nitras Induratus, using about 1·5 grammes accurately weighed, contains not less than 32 per cent. and not more than 34 per cent. of $AgNO_3$.

BALNEA

Baths

The quantity of water used for a full-sized bath is usually 30 gallons. The temperature at which medicinal baths are given is from 35° to 40°, unless otherwise stated. For a cold bath (Balneum Frigidum), the patient is placed in water at 35° and the temperature of the water is lowered to 15° by the addition of ice. A tepid bath (Balneum Tepidum) is given at from 30° to 35°, and a hot bath (Balneum Calidum) at from 37° to 43°. Effervescing baths are given at a slightly lower temperature than ordinary baths, the effervescence giving to the patient an increased sense of warmth.

Medicated baths are prepared with the following quantities of medicaments in 140 litres (30 gallons) of water:—

Balneum Acidum.—Dilute nitro-hydrochloric acid, 440 millilitres (15 fluid ounces).

Balneum Alkalinum.—Sodium carbonate, 150 grammes (5 ounces).

Balneum Furfuris.—Bran, 1850 grammes (4 pounds).

Balneum Iodi.—Strong solution of iodine, 120 millilitres (4 fluid ounces).

Balneum Magnesii Sulphatis.—Magnesium sulphate, 460 grammes (16 ounces).

Balneum Sinapis.—Bath mustard, 350 grammes (12 ounces).

Balneum Sodii Chloridi.—Sodium chloride, 3250 grammes (7 pounds).

Balneum Sulphuratum.—Sulphurated potash, 230 grammes (8 ounces).

Balneum Sulphuris.—Sodium acid sulphate and sodium thiosulphate, of each, 150 grammes (5 ounces).

BALNEUM EFFERVESCENS

(Baln. Efferv.)

Effervescent Bath

	Metric	*Imperial*
Sodium Bicarbonate	460 g.	16 oz.
Sodium Acid Sulphate	230 g.	8 oz.
Water	to 140 litres	to 30 gallons

Dissolve the sodium bicarbonate in the water and add the sodium acid sulphate.

BALNEUM EFFERVESCENS CUM CHLORIDO

(Baln. Efferv. c. Chlorid.)

Effervescent Bath with Chloride

	Metric	*Imperial*
Sodium Bicarbonate	460 g.	16 oz.
Sodium Acid Sulphate	230 g.	8 oz.
Sodium Chloride..	1400 g.	48 oz.
Calcium Chloride	230 g.	8 oz.
Water	to 140 litres	to 30 gallons

Dissolve the sodium bicarbonate and the chlorides in the water and add the sodium acid sulphate.

BOROGLYCERINUM

(Boroglycer.)

Boroglycerin

	Metric	*Imperial*
Boric Acid, in powder	480 g.	7½ oz.
Glycerin	640 g.	10 oz.

Add 320 grammes (5 ounces) of the boric acid to the glycerin, heat to a temperature rising to, but not exceeding, 150° until the weight of the mixture is reduced to 850 grammes (13¾ ounces); then cool and mix with the remainder of the boric acid.

BUGINARIA

Bougies

Bougies are medicated pencils, specially adapted for the application of medicinal substances to the urethra, the nostrils, or the ears. They are prepared in the same way as suppositories, but they differ in shape, resembling a pointed rod. The basis is either oil of theobroma, or gelato-glycerin which may be prepared by dissolving 32·5 grammes (3¼ ounces) of gelatin in a mixture of 40 millilitres (4 fluid ounces) of glycerin and 40 millilitres (4 fluid ounces) of distilled water, the solution being evaporated on a water-bath to 100 grammes (10 ounces). The medicament should be incorporated in the melted basis, as in the preparation of suppositories, and the mixture poured down a warm wire or glass rod into suitable moulds, or drawn up into a lubricated glass tube of suitable diameter, allowed to solidify, then pushed out with a glass rod, and cut to the correct length, one end being subsequently pointed.

Urethral Bougies may have either a gelato-glycerin or oil of theobroma basis and may be of any length up to 15 centimetres (6 inches). Usually they are 6·5 centimetres (2½ inches) or 13 centimetres (5 inches) long, and weigh 1 gramme (15 grains) or 2·5 grammes (40 grains) and

have about the diameter of a No. 8 or No. 9 catheter respectively. When the size is not specified, the smaller size should be supplied. The oil of theobroma may be replaced, if desired, by one of the following mixtures: (1) Oil of theobroma, 90 parts; wool fat, 10 parts. Melt together and stir until cold. (2) Oil of theobroma, 50 parts; hydrous wool fat, 25 parts; white beeswax, 25 parts. Melt together and stir until cold.

Nasal Bougies resemble urethral bougies in shape but are 3 inches in length, and weigh about 18 grains. They are usually made with a gelato-glycerin basis.

Aural Bougies are shaped like the other bougies but are about ½ inch in length, and weigh about 6 grains. Unless otherwise ordered, they are made with a gelato-glycerin basis.

BUGINARIA COCAINÆ

(Bugin. Cocain.)

Cocaine Urethral Bougies

	Metric	*Imperial*
Cocaine	0·032 g.	½ gr.
Oil of Theobroma	sufficient to fill a 1 gramme (15 grain) mould.	

Triturate the cocaine with a small quantity of the melted oil of theobroma, then add the remainder and pour into a suitable mould.

CAPSULÆ

Capsules

Capsules are used for enclosing medicaments for internal use and are made with a gelatin base containing a varying amount of glycerin according to the degree of hardness required. It is unusual to put liquids in hard capsules. Perles are capsules prepared by means of suitable machinery. The following formula yields a mass for soft capsules which is suitable for ordinary use.

	Metric	*Imperial*
Gelatin	24 g.	3 oz. 367½ gr.
Syrup	7 g.	1 oz. 52½ gr.
Glycerin	18 g.	2 oz. 385 gr.
Mucilage of Acacia	6 g.	420 gr.
Distilled Water	to 100 g.	to 16 oz.

Mix the syrup, glycerin, mucilage of acacia and distilled water and soak the gelatin in the mixture; when the gelatin has become thoroughly softened, heat on a water-bath until dissolved. When a softer

capsule is required, the mucilage of acacia may be replaced by syrup, glycerin, or water, or by mixtures of these ingredients, according to the degree of hardness required. Soft capsules are obtainable in various sizes having capacities of 0·2, 0·3, 0·6, 0·9, 1·2, 1·8, 3·5 and 5·3 millilitres (3, 5, 10, 15, 20, 30, 60 and 90 minims).

Aqueous or alcoholic liquids tend to soften the capsule and such liquids should be concentrated and mixed with almond oil or liquid paraffin before being placed in the capsules. Liquid extracts are generally evaporated so that a 0·6 millilitre (10 minim) capsule represents 2 millilitres (30 minims) of the normal extract. Soft aqueous extracts or masses should similarly be incorporated with a little soft paraffin. Liquids such as creosote, guaiacol, oils of cinnamon and clove, etc., which may cause discomfort in the stomach if enclosed undiluted in capsules, should be mixed with four times their volume of almond or olive oil. Solids, such as quinine sulphate and ammonium bicarbonate, for administration in soft gelatin capsules should be powdered, and mixed separately with a basis of liquid and soft paraffins.

Hard or soft gelatin capsules containing such substances as pancreatin or extract of male fern, are required to pass through the stomach undissolved and to dissolve in the intestines. For this purpose they should, after filling and sealing, be immersed for five minutes in solution of formaldehyde diluted with three times its volume of water, and afterwards dried. Such capsules are known as glutoid capsules. The action of formaldehyde on the gelatin in the base varies with the time of immersion and the amount of gelatin in the base; the solubility of the finished capsules may be tested by treatment with suitable reagents. Capsules which dissolve in an aqueous solution of glycerin of pepsin and hydrochloric acid, when maintained in the reagent at 37° to 38° for two hours, will probably dissolve in the stomach, whereas capsules which dissolve within two hours at 37° to 38° in an aqueous solution of sodium bicarbonate containing pancreatin, may dissolve readily in the duodenum. Variation in the composition of the capsule-mass influences greatly the effect of the reagents and the strengths of the latter, therefore, require adjustment for different masses.

CAPSULÆ QUININÆ AMMONIATÆ

(Caps. Quinin. Ammon.)

Capsules of Ammoniated Quinine

	Metric	*Imperial*
Quinine Sulphate	0·065 g.	1 gr.
Ammonium Bicarbonate ..	0·162 g.	2½ gr.

Mix separately with a suitable paraffin basis and enclose in a capsule.

Dose.– 1 capsule.

CAPSULÆ QUININÆ AMMONIATÆ ET CINNAMOMI

(Caps. Quinin. Ammon. et Cinnam.)

Capsules of Ammoniated Quinine and Cinnamon

	Metric	*Imperial*
Quinine Sulphate	0·065 g.	1 gr.
Ammonium Bicarbonate.. ..	0·162 g.	2½ gr.
Oil of Cinnamon	0·015 ml.	¼ m.

Mix separately with a suitable paraffin basis and enclose in a capsule.

Dose.– 1 capsule.

CAPSULÆ QUININÆ ET CINNAMOMI

(Caps. Quinin. et Cinnam.)

Capsules of Quinine and Cinnamon

	Metric	*Imperial*
Quinine Sulphate	0·065 g.	1 gr.
Oil of Cinnamon	0·059 ml.	1 m.

Mix separately with a suitable paraffin basis and enclose in a capsule.

Dose.– 1 capsule.

CAPSULÆ AMYLACEÆ

Cachets

Cachets are containers prepared from a mixture of flour and water, consisting of two circular discs adhering by their edges and are filled and closed by means of a suitable machine. They form one of the most useful methods of administering a solid medicament in tasteless form. Dry-closing cachets are also used and are recommended on account of the ease with which they may be filled and sealed. Cachets are obtainable in various sizes, the diameter of the smallest being somewhat larger than that of a 5 grain pill and the largest holding about 20 grains of a powder of medium density. When labelling cachets, in addition to the directions of the physician, instructions should be given as to the method of taking them. They should be immersed in water for a few seconds, then swallowed with the liquid.

Substances having a dosage of under 0·06 gramme (1 grain) should be triturated with lactose before being placed in the cachet. Hygroscopic substances should not be prescribed in cachets, but when so ordered it is advisable to mix them with powdered liquorice. Soft pill masses flattened into small discs and well covered with an inert absorbent powder may be dispensed in cachets. Bi-cachets should be used for substances which interact, the salts being placed separately in the halves of the cachet and separated by a single cachet disc of smaller diameter than the cachet which is being used.

CASEINUM GLYCEROPHOSPHATICUM

(Casein. Glycerophosph.)

Glycerophosphated Casein

	Metric	*Imperial*
Soluble Casein	950 g.	15 oz. 87½ gr.
Sodium Glycerophosphate ..	25 g.	175 gr.
Calcium Glycerophosphate ..	25 g.	175 gr.

Powder the glycerophosphates and mix thoroughly with the soluble casein.

It should be **stored** in well-closed containers.

Dose.– 4 to 16 grammes (1 to 4 drachms).

CATAPLASMATA

Poultices

Poultices are thick, pasty preparations, usually intended to be made extemporaneously. They are frequently prepared with stale bread, crushed linseed or powdered slippery elm and, except in special cases, boiling water is placed in a previously warmed basin and the material stirred in with a spoon until a mass of the proper consistence results. The poultice is placed in a muslin bag and applied hot; it may be covered, if necessary, with jaconet, oiled silk, or gutta-percha tissue.

For medicated and other poultices, unless otherwise directed by the prescriber, the following proportions are suitable for use:—

Cataplasma Acidi Borici.—Boric acid, 20 per cent., in linseed poultice.

Cataplasma Acidi Borici et Carbonis.—Boric acid and charcoal, of each 4 per cent., in slippery elm poultice.

Cataplasma Amyli.—Starch, 10 per cent., boiled with water.

Cataplasma Amyli et Acidi Borici.—Boric acid, 6 per cent., in starch poultice.

Cataplasma Carbonis.—Charcoal, 10 per cent., in linseed poultice.

Cataplasma Iodi.—Weak solution of iodine, 2 fluid drachms, in linseed poultice.

Cataplasma Phenolis.—Phenol, 2 per cent., in linseed poultice.

Cataplasma Sinapis.—Mustard flour, 2 per cent., in linseed poultice.

Cataplasma Sodæ Chlorinatæ.—Linseed poultice prepared with a mixture of equal volumes of solution of chlorinated soda and water.

CERA ASEPTICA

(Cera Asep.)

Aseptic Wax

	Metric	*Imperial*
White Beeswax	875 g.	14 oz.
Almond Oil	125 ml.	2 fl. oz.
Salicylic Acid	10 g.	70 gr.

Melt the beeswax with the oil and strain through muslin, add the salicylic acid and heat for thirty minutes on a water-bath.

It should be **stored** in sterilised bottles, covered with an aqueous solution (1 in 500) of mercuric chloride.

CHARTA NITRATA

(Charta Nit.)

Nitrated Paper

Synonyms—Saltpetre Paper; Nitre Paper.

Nitrated paper is prepared by saturating white blotting paper with a 20 per cent. w/v aqueous solution of potassium nitrate, and drying.

CHLORAL CAMPHORATUM

(Chloral Camph.)

Camphorated Chloral

Synonym—Chloral cum Camphora.

	Metric	*Imperial*
Camphor	500 g.	8 oz.
Chloral Hydrate	500 g.	8 oz.

Rub together in a warm mortar until completely liquefied, and strain if necessary. The product measures about 875 millilitres (14 fluid ounces).

CHLOROFORMUM ACONITI

(Chlorof. Aconit.)

Chloroform of Aconite

	Metric	*Imperial*
Aconite, in moderately fine powder	1000 g.	20 oz.
Dilute Solution of Ammonia ..	250 ml.	5 fl. oz.
Alcohol (90 per cent.)	a sufficient quantity	
Chloroform	a sufficient quantity	

Moisten the aconite with the dilute solution of ammonia and set aside for twenty-four hours. Transfer to a percolator, and percolate with a menstruum consisting of one volume of alcohol and seven volumes of chloroform until 1000 millilitres (20 fluid ounces) of percolate is obtained.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

CHLOROFORMUM ATROPINÆ

(Chlorof. Atrop.)

Chloroform of Atropine

	Metric	*Imperial*
Atropine	4·6 g.	40 gr.
Alkanna, coarsely powdered ..	2·3 g.	20 gr.
Chloroform	to 1000·0 ml.	to 20 fl. oz.

Macerate the alkanna in 900 millilitres (18 fluid ounces) of chloroform for forty-eight hours, filter, dissolve the atropine in the liquid, and add sufficient chloroform to produce the required volume.

CHLOROFORMUM BELLADONNÆ

(Chlorof. Bellad.)

Chloroform of Belladonna

	Metric	*Imperial*
Liquid Extract of Belladonna ..	500·0 ml.	10 fl. oz.
Heavy Magnesium Oxide ..	4·6 g.	40 gr.
Exsiccated Sodium Sulphate ..	300·0 g.	6 oz.
Alcohol (90 per cent.)	100·0 ml.	2 fl. oz.
Chloroform	to 1000·0 ml.	to 20 fl. oz.

Place the liquid extract, magnesium oxide, alcohol and 750 millilitres (15 fluid ounces) of the chloroform in a dry bottle and shake well; add three-quarters of the exsiccated sodium sulphate, shake frequently during ten minutes and filter; to the filtrate add the remainder of the exsiccated sodium sulphate, agitate as before, filter, and add sufficient chloroform to produce the required volume.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength and the liquid extract of belladonna may be replaced by liquid extract of belladonna prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

CHLOROFORMUM CAMPHORATUM
(Chlorof. Camph.)

Camphorated Chloroform

Synonym—Chloroform of Camphor.

	Metric	*Imperial*
Camphor	600 g.	12 oz.
Chloroform	300 ml.	6 fl. oz.

Dissolve the camphor in the chloroform. The product measures about 900 millilitres (18 fluid ounces).

COLLODIUM ACETONUM
(Collod. Aceton.)

Acetone Collodion

	Metric	*Imperial*
Pyroxylin	50 g.	1 oz.
Oil of Clove	20 ml.	192 m.
Amyl Acetate	250 ml.	5 fl. oz.
Benzene	200 ml.	4 fl. oz.
Acetone	to 1000 ml.	to 20 fl. oz.

Dissolve the pyroxylin in 500 millilitres (10 fluid ounces) of the acetone, add the oil of clove, amyl acetate, benzene and sufficient acetone to produce the required volume.

COLLODIUM ANODYNUM
(Collod. Anodyn.)

Anodyne Collodion

Synonym—Anodyne Colloid.

	Metric	*Imperial*
Aconitine	1·1 g.	10 gr.
Veratrine	6·9 g.	60 gr.
Acetone	300·0 ml.	6 fl. oz.
Acetone Collodion	to 1000·0 ml.	to 20 fl. oz.

Dissolve the aconitine and veratrine in the acetone and add sufficient acetone collodion to produce the required volume.

COLLODIUM ATROPINÆ
(Collod. Atrop.)
Atropine Collodion

	Metric	Imperial
Atropine	4·6 g.	40 gr.
Acetone	300 0 ml.	6 fl. oz.
Acetone Collodion .. .	to 1000 0 ml.	to 20 fl. oz.

Dissolve the atropine in the acetone and add sufficient acetone collodion to produce the required volume.

COLLODIUM BELLADONNÆ
(Collod. Bellad.)
Belladonna Collodion

Synonyms—Emplastrum Belladonnæ Fluidum; Liquid Belladonna Plaster.

	Metric	Imperial
Liquid Extract of Belladonna ..	500 ml.	10 fl. oz.
Canada Balsam	40 g.	350 gr.
Castor Oil	20 ml.	192 m.
Camphor	15 g.	131½ gr.
Pyroxylin	25 g.	½ oz.
Alcohol (90 per cent.)	100 ml.	2 fl. oz.
Ether	to 1000 ml.	to 20 fl. oz.

Mix the liquid extract of belladonna, canada balsam, castor oil, alcohol and 400 millilitres (8 fluid ounces) of the ether, shake well and allow to stand for twelve hours; decant the clear liquid and strain the remainder, mix the two liquids, dissolve the camphor and pyroxylin in the mixture and add sufficient ether to produce the required volume.

In making this preparation the alcohol (90 per cent) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, and the liquid extract of belladonna may be replaced by liquid extract of belladonna prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed

COLLODIUM CARBOLISATUM
(Collod. Carbol.)
Carbolised Collodion

	Metric	Imperial
Phenol	500 g.	8 oz.
Simple Collodion	500 g.	8 oz.

Melt the phenol and mix with the simple collodion so as to form a jelly.

COLLODIUM ICHTHAMMOLIS
(Collod. Ichtham.)

Ichthammol Collodion

Synonym—Ammonium Ichthosulphonate Collodion.

	Metric	*Imperial*
Ichthammol	125 g.	2½ oz.
Simple Collodion	to 1000 ml.	to 20 fl. oz.

Dissolve the ichthammol in sufficient simple collodion to produce the required volume.

COLLODIUM ICHTHAMMOLIS CUM ÆTHERE
(Collod. Ichtham. c. Æth.)

Ichthammol Collodion with Ether

Synonym—Ammonium Ichthosulphonate Collodion with Ether.

	Metric	*Imperial*
Ichthammol	250 g.	5 oz.
Ether	250 ml.	5 fl. oz.
Simple Collodion	to 1000 ml.	to 20 fl. oz.

Mix the ether with about 500 millilitres (10 fluid ounces) of simple collodion, dissolve the ichthammol in the mixture, and add sufficient simple collodion to produce the required volume.

COLLODIUM IODI
(Collod. Iod.)

Iodine Collodion

	Metric	*Imperial*
Iodine	65 g.	1 oz. 131¼ gr.
Flexible Collodion	to 1000 ml.	to 20 fl. oz.

Dissolve the iodine in sufficient flexible collodion to produce the required volume.

COLLODIUM SALICYLICUM
(Collod. Salicyl.)

Salicylic Collodion

	Metric	*Imperial*
Salicylic Acid	120 g.	2 oz. 175 gr.
Acetone	300 ml.	6 fl. oz.
Acetone Collodion	to 1000 ml.	to 20 fl. oz.

Dissolve the salicylic acid in the acetone and add sufficient acetone collodion to produce the required volume.

COLLODIUM SALICYLICUM COMPOSITUM

(Collod. Salicyl. Co.)

Compound Salicylic Collodion

Synonym—Collodium Callosum.

	Metric	*Imperial*
Salicylic Acid	120 g.	2 oz. 175 gr.
Extract of Cannabis	20 g.	175 gr.
Acetone	300 ml.	6 fl. oz.
Acetone Collodion	to 1000 ml.	to 20 fl. oz.

Dissolve the salicylic acid and the extract of cannabis in the acetone and add sufficient acetone collodion to produce the required volume.

COLLODIUM SIMPLEX

(Collod. Simp.)

Simple Collodion

	Metric	*Imperial*
Pyroxylin	21 g.	183¾ gr.
Ether	750 ml.	15 fl. oz.
Alcohol (90 per cent.)	250 ml.	5 fl. oz.

Immerse the pyroxylin in the alcohol, add the ether and shake occasionally until dissolved; set aside for a few days and decant if necessary.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

COLLODIUM STYPTICUM

(Collod. Stypt.)

Styptic Collodion

	Metric	*Imperial*
Benzoin, crushed..	15 g.	131¼ gr.
Alcohol (90 per cent.)	150 ml.	3 fl. oz.
Tannic Acid	150 g.	3 oz.
Simple Collodion	to 1000 ml.	to 20 fl. oz.

Dissolve the benzoin and tannic acid in the alcohol and add sufficient simple collodion to produce the required volume; set aside for three days and decant the clear liquid.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

COLLODIUM VESICANS

(Collod. Vesic.)

Blistering Collodion

	Metric	*Imperial*
Pyroxylin	25 g.	½ oz.
Cochineal, in powder	10 g.	87½ gr.
Blistering Liquid..	to 1000 ml.	to 20 fl. oz.

Shake the cochineal with the pyroxylin and sufficient blistering liquid to produce the required volume until the pyroxylin is dissolved; set aside until clear and decant the clear liquid.

COLLYRIA

Eye Lotions

Eye lotions are usually solutions in water of one or more substances. As far as possible they should be sterile, and they should be entirely free from foreign matter. In most cases, the final product should be filtered, preferably through a bacteria-proof filter. When complete sterilisation is not possible, the distilled water employed should be freshly boiled. The use of aromatic waters as vehicles should in general be discouraged; when they are prescribed the concentrated waters should be diluted immediately before use with freshly boiled and cooled distilled water. Eye lotions should be dispensed in sterile stoppered bottles of distinctive shape.

Isotonic Eye Lotions. To prepare an aqueous solution of any one of the following substances so that it is isotonic with the lachrymal secretion, the quantity given below should be dissolved in sufficient water to produce 100 millilitres (4 fluid ounces):—

Boric Acid	3·1 grammes	(54¼ grains)
Potassium Nitrate	2·4 grammes	(42 grains)
Sodium Bicarbonate	2·0 grammes	(35 grains)
Sodium Chloride..	1·4 grammes	(24½ grains)
Sodium Nitrate	2·0 grammes	(35 grains)

When an eye lotion is required to be rendered isotonic by the addition of another substance, the amount to be added, W, may be calculated approximately from the formula

$$W = \frac{0{\cdot}86 - a}{b} \text{ per cent. w/v,}$$

where a denotes the freezing-point of the unadjusted lotion in degrees below 0° and b denotes the depression of the freezing-point of water produced by 1 per cent. w/v of the adjusting substance.

The value of a for any prescribed strength of a substance may be found by multiplying the strength expressed as a percentage w/v by

the value of *b* for the same substance. The values of *b* for a number of substances are given under Injectiones.

The following substances are used in eye lotions; when the proportions are not indicated by the prescriber, the following strengths should be dispensed:—

Collyrium Acidi Salicylici.—Salicylic acid, 0·1 per cent. w/v.

Collyrium Ammonii Chloridi.— Ammonium chloride, 0·5 per cent. w/v.

Collyrium Belladonnæ.— Green extract of belladonna, 0·5 per cent. w/v.

Collyrium Boracis.—Borax, 1 per cent. w/v.

Collyrium Cupri Sulphatis.—Copper sulphate, 0·25 per cent. w/v.

Collyrium Hydrargyri Perchloridi.—Mercuric chloride, 0·02 per cent. w/v.

Collyrium Picis Carbonis.—Solution of coal tar, 0·6 per cent. w/v.

Collyrium Quininæ Hydrochloridi.— Quinine hydrochloride, 0·5 per cent. w/v.

Collyrium Sodii Bicarbonatis.— Sodium bicarbonate, 2 per cent. w/v.

Collyrium Zinci Chloridi.—Zinc chloride, 0·1 per cent. w/v.

Collyrium Zinci Sulphatis.—Zinc sulphate, 0·2 per cent. w/v.

COLLYRIUM ACIDI BORICI

(Collyr. Acid. Boric.)

Boric Acid Eye Lotion

	Metric	*Imperial*
Boric Acid	20 g.	175 gr.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve.

COLLYRIUM ACIDI BORICI ET ZINCI

(Collyr. Acid. Boric. et Zinc.)

Boric Acid and Zinc Eye Lotion

	Metric	*Imperial*
Boric Acid	10 g.	87½ gr.
Zinc Sulphate	2 g.	17½ gr.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve.

COLLYRIUM ALUMINIS
(Collyr. Alum.)
Alum Eye Lotion

	Metric	*Imperial*
Alum	10 g.	87½ gr.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve.

CONFECTIO GUAIACI COMPOSITA
(Conf. Guaiac. Co.)
Compound Confection of Guaiacum

Synonym—Chelsea Pensioner.

	Metric	*Imperial*
Guaiacum Resin, in powder ..	10 g.	70 gr.
Rhubarb, in powder	20 g.	140 gr.
Potassium Acid Tartrate ..	75 g.	1 oz. 87½ gr.
Nutmeg, in powder	10 g.	70 gr.
Sublimed Sulphur	145 g.	2 oz. 140 gr.
Purified Honey	740 g.	11 oz. 367½ gr.

Mix the guaiacum resin, rhubarb, potassium acid tartrate, nutmeg and sulphur and add gradually to the purified honey with constant trituration; mix thoroughly.

Dose.– 4 to 8 grammes (1 to 2 drachms).

CONFECTIO PIPERIS
(Conf. Piper.)
Confection of Pepper

	Metric	*Imperial*
Black Pepper, in powder ..	100 g.	1 oz. 262½ gr.
Caraway, in powder	150 g.	2 oz. 175 gr.
Purified Honey	750 g.	12 oz.

Mix.

Dose.– 4 to 8 grammes (1 to 2 drachms).

CONFECTIO ROSÆ CANINÆ
(Conf. Ros. Can.)
Confection of Rose Fruit

Synonym—Confection of Hips.

Rose Fruit, deprived of its achenes	a sufficient quantity
Sucrose	a sufficient quantity

Beat the rose fruit in a stone mortar and rub the pulp thus produced through a sieve; add to the product twice its weight of sucrose and rub them well together.

CONFECTIO ROSÆ GALLICÆ

(Conf. Ros. Gall.)

Confection of Roses

	Metric	*Imperial*
Red-rose Petal, fresh	250 g.	4 oz.
Sucrose	750 g.	12 oz.

Beat together in a stone mortar.

CONFECTIO SENNÆ ET SULPHURIS

(Conf. Senn. et Sulphur.)

Confection of Senna and Sulphur

	Metric	*Imperial*
Confection of Senna	500 g.	8 oz.
Confection of Sulphur	500 g.	8 oz.

Mix thoroughly.

Dose.– 4 to 8 grammes (1 to 2 drachms).

CREMOR ZINCI

(Crem. Zinc.)

Zinc Cream

	Metric	*Imperial*
Zinc Oxide, finely sifted.. ..	320 g.	5 oz. 52½ gr.
Wool Fat	80 g.	1 oz. 122½ gr.
Almond Oil	320 ml.	5 fl. oz. 57½ m.
Solution of Calcium Hydroxide	to 1000 g.	to 16 oz.

Triturate the zinc oxide with the almond oil, incorporate the wool fat and sufficient solution of calcium hydroxide to produce the required weight.

CRETA CUM CAMPHORA

(Cret. c. Camph.)

Camphorated Chalk

	Metric	*Imperial*
Camphor	100 g.	1 oz.
Calcium Carbonate	900 g.	9 oz.

Dissolve the camphor in 50 millilitres (½ fluid ounce) of warm alcohol (90 per cent.), add the solution to 300 millilitres (3 fluid ounces) of water, collect the precipitated camphor, allow to drain, mix with the calcium carbonate and pass through a fine sieve.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

DECOCTA

Decoctions

A decoction is an aqueous preparation of a drug made by boiling the drug, either whole or suitably prepared, with distilled water for a specified time, straining and, if necessary, making up to the required volume with more distilled water. The method is applicable to drugs containing astringent matter and those of a hard resinous nature which do not readily yield their active principles to water. It is not suitable for drugs containing volatile or aromatic principles. When such drugs are ingredients of decoctions they are added towards the end of the period of boiling. Care should be taken in the choice of vessel for boiling. Glass, earthenware, enamelled-iron, or acid-resisting metal vessels are preferable, but aluminium, uncoated iron, copper, tinware and soldered vessels should be avoided. Decoctions are liable to undergo decomposition and should be freshly prepared. Concentrated decoctions, when suitably diluted, yield preparations of approximately the same composition as the ordinary decoctions.

In the absence of any specific instructions for making a decoction, 5 parts of drug should be boiled with 120 parts of distilled water for ten minutes, strained, and the volume adjusted, if necessary, to 100 parts by the addition of distilled water.

DECOCTUM AGROPYRI

(Dec. Agropyr.)

Decoction of Couch Grass

Synonym—Decoction of Triticum.

	Metric	*Imperial*
Couch Grass, cut small	50 g.	1 oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Boil the couch grass for ten minutes with 1200 millilitres (24 fluid ounces) of distilled water. Allow to cool, strain and, if necessary, pour sufficient distilled water over the contents of the strainer to produce the required volume.

Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

DECOCTUM ALOES COMPOSITUM

(Dec. Aloes Co.)

Compound Decoction of Aloes

	Metric	*Imperial*
Aloes	10 g.	87½ gr.
Myrrh	5 g.	43¾ gr.
Potassium Carbonate	5 g.	43¾ gr.
Extract of Liquorice	40 g.	350 gr.
Compound Tincture of Cardamom	300 ml.	6 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Reduce the aloes and the myrrh to coarse powder, add the potassium carbonate and the extract of liquorice, and boil with 400 millilitres (8 fluid ounces) of distilled water in a covered vessel for five minutes; cool, add the compound tincture of cardamom, set aside for two hours, strain through flannel and pour sufficient distilled water over the contents of the strainer to produce the required volume.

Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

When compound decoction of aloes (Decoctum Aloes Compositum) is prescribed, either the above preparation, or Decoctum Aloes Compositum Concentratum diluted with three times its volume of distilled water, may be dispensed.

DECOCTUM ALOES COMPOSITUM CONCENTRATUM

(Dec. Aloes Co. Conc.)

Concentrated Compound Decoction of Aloes

	Metric	*Imperial*
Aloes	40·0 g.	350 gr.
Myrrh	20·0 g.	175 gr.
Potassium Carbonate	20·0 g.	175 gr.
Extract of Liquorice	160·0 g.	3 oz. 87½ gr.
Cochineal, in powder	12·0 g.	105 gr.
Cardamom, in powder	15·0 g.	131½ gr.
Oil of Cinnamon	0·3 ml.	3 m.
Oil of Caraway	0·4 ml.	4 m.
Alcohol (90 per cent.)	150·0 ml.	3 fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Reduce the aloes and the myrrh to coarse powder, add the potassium carbonate, extract of liquorice and cochineal; boil with 500 millilitres (10 fluid ounces) of distilled water until the extract and the aloes are dissolved, and filter; macerate the cardamom in the alcohol, filter, and

add the oils; mix the two liquids, add sufficient distilled water to produce the required volume and filter if necessary.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

This concentrated decoction when diluted with three times its volume of distilled water yields a preparation which is approximately equivalent in strength to compound decoction of aloes, but contains a smaller proportion of alcohol.

DECOCTUM CHONDRI

(Dec. Chond.)

Decoction of Chondrus

Synonyms—Decoction of Irish Moss; Mucilago Chondri; Mucilage of Irish Moss.

	Metric	*Imperial*
Chondrus..	25 g.	½ oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Wash the chondrus in cold water to remove impurities and boil with 1200 millilitres (24 fluid ounces) of distilled water for fifteen minutes. Strain while hot and, if necessary, pour sufficient distilled water over the contents of the strainer to produce the required volume.

It should be freshly prepared.

Dose.– 30 to 120 millilitres (1 to 4 fluid ounces), or more.

DECOCTUM CINCHONÆ CONCENTRATUM

(Dec. Cinchon. Conc.)

Concentrated Decoction of Cinchona

	Metric	*Imperial*
Cinchona, in moderately coarse powder	500 g.	10 oz.
Glycerin	250 ml.	5 fl. oz.
Alcohol (90 per cent.) ..	100 ml.	2 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Add the cinchona to 8000 millilitres (160 fluid ounces) of boiling distilled water and continue to boil for ten minutes in a covered vessel. Allow to cool, strain, and wash the contents of the strainer with distilled water. Evaporate the mixed decoction and washings to 650 millilitres (13 fluid ounces); allow to cool, filter, add the glycerin, the alcohol, and, if necessary, sufficient distilled water to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

When decoction of cinchona (Decoctum Cinchonæ) is prescribed, this concentrated decoction diluted with seven times its volume of distilled water may be dispensed.

DECOCTUM GOSSYPII CORTICIS
(Dec. Gossyp. Cort.)

Decoction of Cotton Root Bark

	Metric	*Imperial*
Cotton Root Bark, bruised ..	200 g.	4 oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Boil the cotton root bark with 2000 millilitres (40 fluid ounces) of distilled water until the volume is reduced to 1000 millilitres (20 fluid ounces); strain, and pour sufficient distilled water over the contents of the strainer to produce the required volume.

Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

DECOCTUM HÆMATOXYLI
(Dec. Hæmatox.)

Decoction of Logwood

	Metric	*Imperial*
Logwood, in chips	50 g.	1 oz.
Cinnamon, bruised	10 g.	87½ gr.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Boil the logwood with 1200 millilitres (24 fluid ounces) of distilled water for ten minutes, adding the cinnamon towards the end of the time; strain and, if necessary, pour sufficient distilled water over the contents of the strainer to produce the required volume.

Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

DECOCTUM HORDEI
(Dec. Hord.)

Decoction of Barley

Synonym—Barley Water.

	Metric	*Imperial*
Pearl Barley, of commerce ..	100 g.	2 oz.
Distilled Water	1500 ml.	30 fl. oz.

Wash the pearl barley with cold water and reject the washings; boil the washed barley with the distilled water for twenty minutes in a covered vessel and strain. The product measures about 1000 millilitres (20 fluid ounces).

Dose.– 30 to 120 millilitres (1 to 4 fluid ounces).

DECOCTUM PAPAVERIS ET ANTHEMIDIS FORTE

(Dec. Papav. et Anthem. Fort.)

Strong Decoction of Poppy and Chamomile

Synonym—Decoctum Papaveris et Anthemidis Concentratum.

	Metric	*Imperial*
Chamomile	250 g.	5 oz.
Poppy Capsule, bruised	250 g.	5 oz.
Alcohol (90 per cent.)	250 ml.	5 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Boil the chamomile and the poppy capsule for ten minutes with 6000 millilitres (120 fluid ounces) of distilled water. Pour off the liquid and evaporate it to 500 millilitres (10 fluid ounces); exhaust the chamomile and poppy capsule with a further quantity of water, decant the liquid, evaporate it to 250 millilitres (5 fluid ounces) and mix with the previously reserved liquid. Allow to cool and add the alcohol; allow to settle, decant the clear liquid, filter the remainder and mix.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

DECOCTUM QUERCUS

(Dec. Querc.)

Decoction of Oak Bark

	Metric	*Imperial*
Oak Bark, bruised	62·5 g.	1¼ oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Boil the oak bark in a covered vessel for ten minutes with 1000 millilitres (20 fluid ounces) of distilled water; strain, and pour sufficient distilled water over the contents of the strainer to produce the required volume.

DECOCTUM SARSÆ COMPOSITUM

(Dec. Sars. Co.)

Compound Decoction of Sarsaparilla

	Metric	*Imperial*
Sarsaparilla, cut transversely and bruised	125·0 g.	2 oz. 219 gr.
Sassafras Root, in chips ..	12·5 g.	109 gr.
Guaiacum Wood, in shavings ..	12·5 g.	109 gr.
Liquorice, unpeeled, bruised .	12·5 g.	109 gr.
Mezereon, cut small .. .	6·25 g.	54½ gr.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Macerate the sarsaparilla, guaiacum wood, sassafras root, liquorice and mezereon for one hour with 1500 millilitres (30 fluid ounces) of distilled water, then boil for ten minutes, cool, strain, and, if necessary, pour sufficient distilled water over the contents of the strainer to produce the required volume.

Dose.– 60 to 240 millilitres (2 to 8 fluid ounces).

When compound decoction of sarsaparilla (Decoctum Sarsæ Compositum) is prescribed, either the above preparation, or Decoctum Sarsæ Compositum Concentratum diluted with seven times its volume of distilled water, may be dispensed.

DECOCTUM SARSÆ COMPOSITUM CONCENTRATUM

(Dec. Sars. Co. Conc.)

Concentrated Compound Decoction of Sarsaparilla

	Metric	*Imperial*
Sarsaparilla, cut transversely and bruised	1000 g.	20 oz.
Sassafras Root, in chips	100 g.	2 oz.
Guaiacum Wood, in shavings	100 g.	2 oz.
Liquorice, unpeeled, bruised	100 g.	2 oz.
Mezereon, cut small	50 g.	1 oz.
Alcohol (90 per cent.)	225 ml.	4½ fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Add the sarsaparilla to 5000 millilitres (100 fluid ounces) of distilled water at 70° and infuse for one hour at that temperature; repeat the infusion twice with similar quantities of water. Exhaust the other solid ingredients by boiling with distilled water. Mix the three infusions with the decoction and rapidly evaporate the mixture to a volume of 750 millilitres (15 fluid ounces); add the alcohol, set aside for fourteen days, filter, and pour sufficient distilled water over the contents of the filter to produce the required volume.

Dose.– 8 to 30 millilitres (¼ to 1 fluid ounce).

This concentrated decoction when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength to compound decoction of sarsaparilla, but contains about 2·8 per cent. v/v of alcohol (90 per cent.).

DECOCTUM SCOPARII

(Dec. Scopar.)

Decoction of Scoparium

Synonym—Decoction of Broom.

	Metric	*Imperial*
Scoparium, bruised	50 g.	1 oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Boil the scoparium for ten minutes with 1000 millilitres (20 fluid ounces) of distilled water in a covered vessel; strain, and pour sufficient distilled water over the contents of the strainer to produce the required volume.

Dose.– 60 to 120 millilitres (2 to 4 fluid ounces).

When decoction of scoparium (Decoctum Scoparii) is prescribed, either the above preparation, or Decoctum Scoparii Concentratum diluted with seven times its volume of distilled water, may be dispensed.

DECOCTUM SCOPARII CONCENTRATUM

(Dec. Scopar. Conc.)

Concentrated Decoction of Scoparium

Synonym—Concentrated Decoction of Broom.

	Metric	*Imperial*
Scoparium, cut small	400 g.	8 oz.
Alcohol (90 per cent.)	250 ml.	5 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Exhaust the scoparium by boiling for twenty minutes with successive quantities each of about 2000 millilitres (40 fluid ounces) of distilled water. Evaporate the mixed liquids to 750 millilitres (15 fluid ounces), allow to cool, add the alcohol and sufficient distilled water to produce the required volume. Allow to stand for not less than fourteen days and filter.

Dose.– 8 to 16 millilitres (2 to 4 fluid drachms).

This concentrated decoction when diluted with seven times its volume of distilled water yields a preparation which is approximately equivalent in strength to decoction of scoparium, but contains about 3 per cent. v/v of alcohol (90 per cent.).

ELIXIRIA

Elixirs

Elixirs are aromatic liquid preparations frequently containing considerable quantities of alcohol. They range from simple sweetening and flavouring agents, suitable for general use in mixtures, emulsions and similar preparations, to compound elixirs forming convenient means of administering potent or nauseous drugs in palatable form. Alcoholic elixirs should be well diluted at the time of administration.

Elixirs should be bright and clear; when necessary, as for example when the formula includes volatile oil, the product may be shaken with purified talc or kaolin and filtered through paper, precautions being taken to avoid evaporation of alcohol.

ELIXIR ÆTHYLMORPHINÆ ET TERPINI

(Elix. Æthylmorph. et Terpin.)

Elixir of Ethylmorphine and Terpin

	Metric	*Imperial*
Ethylmorphine Hydrochloride ..	2 g.	17½ gr.
Terpin Hydrate	5 g.	43¾ gr.
Alcohol (90 per cent.)	250 ml.	5 fl. oz.
Glycerin	250 ml.	5 fl. oz.
Syrup of Wild Cherry	to 1000 ml.	to 20 fl. oz.

Dissolve the ethylmorphine hydrochloride and the terpin hydrate in the alcohol; add the glycerin and sufficient syrup of wild cherry to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ELIXIR ALETRIDIS

(Elix. Aletr.)

Elixir of Aletris

	Metric	*Imperial*
Liquid Extract of Aletris ..	250 ml.	5 fl. oz.
Liquid Extract of Liquorice ..	60 ml.	1 fl. oz. 96 m.
Simple Elixir	450 ml.	9 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the liquid extracts with the elixir, add the distilled water, allow to stand and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ELIXIR ANISI

(Elix. Anis.)

Elixir of Anise

	Metric	*Imperial*
Oil of Anise	3·13 ml.	30 m.
Oil of Fennel	0·52 ml.	5 m.
Oil of Bitter Almond without Hydrocyanic Acid	0·13 ml.	1¼ m.
Alcohol (90 per cent.)	250·0 ml.	5 fl. oz.
Syrup	625·0 ml.	12½ fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Mix the oils with the alcohol, add the syrup and 125 millilitres (2½ fluid ounces) of distilled water, set aside for twelve hours and add sufficient distilled water to produce the required volume; add 25 grammes (½ ounce) of purified talc or kaolin, shake well and filter.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

ELIXIR AROMATICUM

(Elix. Aromat.)

Aromatic Elixir

Synonyms—Elixir Aurantii; Elixir Aurantii Compositum.

	Metric	*Imperial*
Oil of Orange	2·5 ml.	24 m.
Oil of Lemon	0·6 ml.	6 m.
Oil of Coriander	0·25 ml.	2½ m.
Oil of Anise	0·06 ml.	⅗ m.
Alcohol (90 per cent.)	250·0 ml.	5 fl. oz.
Syrup	375·0 ml.	7½ fl. oz.
Distilled Water	..to 1000·0 ml.	to 20 fl. oz.

Dissolve the oils in the alcohol and add the syrup gradually, shaking well after each addition; then add sufficient distilled water to produce the required volume; add 25 grammes (½ ounce) of purified talc or kaolin, shake and filter.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

ELIXIR BROMOFORMI

(Elix. Bromof.)

Elixir of Bromoform

Synonyms—Mistura Bromoformi Composita; Compound Mixture of Bromoform.

	Metric	*Imperial*
Bromoform	20 ml.	192 m.
Alcohol (90 per cent.)	50 ml.	1 fl. oz.
Tincture of Orange	50 ml.	1 fl. oz.
Compound Tincture of Cardamom	100 ml.	2 fl. oz.
Glycerin	to 1000 ml.	to 20 fl. oz.

Dissolve the bromoform in the alcohol and tincture of orange, add the compound tincture of cardamom, and sufficient glycerin to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

ELIXIR CINCHONÆ
(Elix. Cinchon.)
Elixir of Cinchona

	Metric	*Imperial*
Tincture of Cinchona	150 ml.	3 fl. oz.
Syrup	125 ml.	2½ fl. oz.
Glycerin	125 ml.	2½ fl. oz.
Aromatic Elixir	to 1000 ml.	to 20 fl. oz.

Mix, allow to stand, and filter through a moistened filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Elixir Calisayæ is a similar preparation prepared with tincture of *Cinchona Calisaya* Weddell.

ELIXIR COCÆ
(Elix. Cocæ)
Elixir of Coca

	Metric	*Imperial*
Liquid Extract of Coca	165 ml.	3 fl. oz. 144 m.
Simple Elixir	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

ELIXIR DIAMORPHINÆ ET PINI COMPOSITUM
(Elix. Diamorph. et Pini Co.)
Compound Elixir of Diamorphine and Pine

	Metric	*Imperial*
Oil of Pumilio Pine	8·3 ml.	80 m.
Terpin Hydrate	5·0 g.	43¾ gr.
Diamorphine Hydrochloride ..	0·5 g.	4½ gr.
Alcohol (90 per cent.)	250·0 ml.	5 fl. oz.
Glycerin	250·0 ml.	5 fl. oz.
Compound Solution of Tartrazine	10·4 ml.	100 m.
Sucrose	400·0 g.	8 oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the terpin hydrate and diamorphine hydrochloride in the alcohol, add the glycerin and oil of pumilio pine and shake vigorously. Add 300 millilitres (6 fluid ounces) of distilled water, shake with 25 grammes (½ ounce) of purified talc or kaolin and filter. Dissolve the sucrose in the filtrate, using gentle heat if necessary, add the compound solution of tartrazine and sufficient distilled water to produce the required volume.

It should be **stored** in amber-coloured bottles.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ELIXIR DIAMORPHINÆ ET TERPINI

(Elix. Diamorph. et Terpin.)

Elixir of Diamorphine and Terpin

	Metric	*Imperial*
Diamorphine Hydrochloride ..	1 g.	$8\frac{3}{4}$ gr.
Terpin Hydrate	5 g.	$43\frac{3}{4}$ gr.
Alcohol (90 per cent.)	250 ml.	5 fl. oz.
Glycerin	250 ml.	5 fl. oz.
Syrup of Wild Cherry	to 1000 ml.	to 20 fl. oz.

Dissolve the diamorphine hydrochloride and terpin hydrate in the alcohol, then add the glycerin and sufficient syrup of wild cherry to produce the required volume.

Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

ELIXIR DIAMORPHINÆ ET TERPINI CUM APOMORPHINA

(Elix. Diamorph. et Terpin. c. Apomorph.)

Elixir of Diamorphine and Terpin with Apomorphine

	Metric	*Imperial*
Diamorphine Hydrochloride ..	0·46 g.	4 gr.
Apomorphine Hydrochloride ..	0 57 g.	5 gr.
Terpin Hydrate	5·0 g.	$43\frac{3}{4}$ gr.
Alcohol (90 per cent.)	250·0 ml.	5 fl. oz.
Glycerin	250 0 ml.	5 fl. oz.
Syrup of Wild Cherry ..	to 1000·0 ml.	to 20 fl. oz.

Dissolve the diamorphine hydrochloride, apomorphine hydrochloride and terpin hydrate in the alcohol, then add the glycerin and sufficient syrup of wild cherry to produce the required volume.

Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

ELIXIR EPHEDRINÆ HYDROCHLORIDI

(Elix. Ephed. Hydrochlor.)

Elixir of Ephedrine Hydrochloride

	Metric	*Imperial*
Ephedrine Hydrochloride ..	4·6 g.	40 gr.
Distilled Water	83·3 ml.	1 fl. oz. 320 m.
Glycerin	250·0 ml.	5 fl. oz.
Compound Solution of Tartrazine	10·4 ml.	100 m.
Spirit of Chloroform	50·0 ml.	1 fl. oz.
Tincture of Lemon	50·0 ml.	1 fl. oz.
Alcohol (90 per cent.)	125·0 ml.	$2\frac{1}{2}$ fl. oz.
Syrup	to 1000·0 ml.	to 20 fl. oz.

Dissolve the ephedrine hydrochloride in the distilled water and add the glycerin and compound solution of tartrazine, then add the tincture of lemon, the spirit of chloroform and sufficient syrup to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

ELIXIR EUONYMI ET PULSATILLÆ

(Elix. Euonym. et Pulsat.)

Elixir of Euonymus and Pulsatilla

	Metric	*Imperial*
Tincture of Euonymus	125 ml.	2½ fl. oz.
Tincture of Pulsatilla	125 ml.	2½ fl. oz.
Simple Elixir	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

ELIXIR FORMATUM COMPOSITUM

(Elix. Form. Co.)

Compound Elixir of Formates

Synonyms—Elixir Formatum cum Strychnina; Elixir of Formates with Strychnine.

	Metric	*Imperial*
Sodium Formate	50·0 g.	1 oz.
Potassium Formate	50·0 g.	1 oz.
Solution of Strychnine Hydrochloride	20·8 ml.	200 m.
Simple Elixir	to 1000·0 ml.	to 20 fl. oz.

Dissolve the sodium and potassium formates in 800 millilitres (16 fluid ounces) of the simple elixir, add the solution of strychnine hydrochloride and sufficient simple elixir to produce the required volume, and filter if necessary.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

ELIXIR GUARANÆ

(Elix. Guaran.)

Elixir of Guarana

	Metric	*Imperial*
Tincture of Guarana	800·0 ml.	16 fl. oz.
Oil of Cinnamon	0·5 ml.	5 m.
Syrup	100·0 ml.	2 fl. oz.
Alcohol (60 per cent.)	to 1000·0 ml.	to 20 fl. oz.

Mix the syrup and oil of cinnamon, add the tincture of guarana and sufficient of the alcohol to produce the required volume; add 25 grammes ($\frac{1}{2}$ ounce) of purified talc or kaolin, shake well and filter.

Dose.– 2 to 8 millilitres ($\frac{1}{2}$ to 2 fluid drachms).

ELIXIR HÆMOGLOBINI

(Elix. Hæmoglob.)

Elixir of Hæmoglobin

	Metric	*Imperial*
Hæmoglobin	100·0 g.	2 oz.
Glycerin	100·0 ml.	2 fl. oz.
Alcohol (90 per cent.)	150·0 ml.	3 fl. oz.
Syrup	500·0 ml.	10 fl. oz.
Vanillin	0·23 g.	2 gr.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the hæmoglobin in a mixture of 250 millilitres (5 fluid ounces) of the syrup and 200 millilitres (4 fluid ounces) of the distilled water. Add the vanillin dissolved in the alcohol, the glycerin, the remainder of the syrup and sufficient distilled water to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

ELIXIR IPECACUANHÆ

(Elix. Ipecac.)

Elixir of Ipecacuanha

	Metric	*Imperial*
Liquid Extract of Ipecacuanha	50 ml.	1 fl. oz.
Alcohol (90 per cent.)	50 ml.	1 fl. oz.
Glycerin	250 ml.	5 fl. oz.
Simple Elixir	50 ml.	1 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the liquid extract of ipecacuanha with the alcohol (90 per cent.) and glycerin, add the simple elixir and sufficient distilled water to produce the required volume; allow to stand for not less than three days and filter.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

This elixir contains approximately the same proportion of alkaloids as Tinctura Ipecacuanhæ.

ELIXIR OVOLECITHINI

(Elix. Ovolecithin.)

Elixir of Ovolecithin

Synonyms—Elixir Lecithini; Elixir of Lecithin.

	Metric	*Imperial*
Ovolecithin	18·3 g.	160 gr.
Yolk of Egg	125·0 ml.	2½ fl. oz.
Glycerin	350 0 ml.	7 fl. oz.
Tincture of Lemon	18·75 ml.	180 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Triturate the ovolecithin with the yolk of egg added gradually to form a smooth cream; add the glycerin and tincture of lemon; then add gradually, with constant trituration, sufficient distilled water to produce the required volume.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

ELIXIR PAPAINI

(Elix. Papain.)

Elixir of Papain

	Metric	*Imperial*
Papain	50 g.	1 oz.
Alcohol (90 per cent.)	150 ml.	3 fl. oz.
Distilled Water	450 ml.	9 fl. oz.
Aromatic Elixir	to 1000 ml.	to 20 fl. oz.

Macerate the papain with the alcohol and water for seven days, filter, and add sufficient aromatic elixir to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ELIXIR PEPSINI

(Elix. Pepsin.)

Elixir of Pepsin

	Metric	*Imperial*
Pepsin	50 g.	1 oz.
Alcohol (90 per cent.)	150 ml.	3 fl. oz.
Distilled Water	450 ml.	9 fl. oz.
Aromatic Elixir	to 1000 ml.	to 20 fl. oz.

Macerate the pepsin with the alcohol and water for seven days, filter, and add sufficient aromatic elixir to produce the required volume

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ELIXIR PHENOBARBITONI

(Elix. Phenobarbiton.)

Elixir of Phenobarbitone

	Metric	*Imperial*
Phenobarbitone	5·0 g.	43¾ gr.
Alcohol (90 per cent.)	450·0 ml.	9 fl. oz.
Oil of Orange	4·0 ml.	38½ m.
Oil of Lemon	1·0 ml.	9½ m.
Oil of Coriander	0·4 ml.	4 m.
Oil of Anise	0·1 ml.	1 m.
Glycerin	350·0 ml.	7 fl. oz.
Compound Solution of Tartrazine	10·4 ml.	100 m.
Distilled Water to	1000·0 ml.	to 20 fl. oz.

Dissolve the phenobarbitone and the oils in the alcohol, add the glycerin, the compound solution of tartrazine and sufficient distilled water to produce the required volume. Add 25 grammes (½ ounce) of purified talc or kaolin, shake well and filter.

It should be **stored** in amber-coloured bottles.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

ELIXIR QUININÆ AMMONIATUM ET CINNAMOMI

(Elix. Quinin. Ammon. et Cinnam.)

Ammoniated Elixir of Quinine and Cinnamon

	Metric	*Imperial*
Quinine Sulphate	20·0 g.	175 gr.
Ammonium Carbonate	44·6 g.	390 gr.
Strong Solution of Ammonia ..	10·0 ml.	96 m.
Solution of Cochineal	20·0 ml.	192 m.
Spirit of Chloroform	30·0 ml.	288 m.
Oil of Cinnamon	2·1 ml.	20 m.
Alcohol (90 per cent.)	375·0 ml.	7½ fl. oz.
Syrup of Orange	400·0 ml.	8 fl. oz.
Distilled Water to	1000·0 ml.	to 20 fl. oz.

Dissolve the oil of cinnamon in the alcohol and spirit of chloroform, diffuse the quinine sulphate in the mixture, and add the ammonium carbonate previously dissolved in 150 millilitres (3 fluid ounces) of distilled water mixed with the strong solution of ammonia, the solution of cochineal and the syrup of orange; add, if necessary, sufficient distilled water to produce the required volume, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ELIXIR SACCHARINI

(Elix. Saccharin.)

Elixir of Saccharin

Synonyms—Elixir Glusidi; Elixir of Gluside.

	Metric	*Imperial*
Saccharin	50 g.	1 oz.
Sodium Bicarbonate	30 g.	262½ gr.
Alcohol (90 per cent.)	125 ml.	2½ fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Add the saccharin to the sodium bicarbonate previously dissolved in 800 millilitres (16 fluid ounces) of distilled water; when effervescence ceases add the alcohol, filter and wash the filter with sufficient distilled water to produce the required volume.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

ELIXIR SENNÆ

(Elix. Senn.)

Elixir of Senna

Synonyms—Liquor Sennæ Leguminorum Dulcis; Sweet Essence of Senna Pods.

	Metric	*Imperial*
Liquid Extract of Senna	500·0 ml.	10 fl. oz.
Sucrose	500·0 g.	10 oz.
Chloroform	2·6 ml.	25 m.
Oil of Coriander	0·2 ml.	2 m.
Tincture of Capsicum	2·1 ml.	20 m.
Alcohol (90 per cent.)	25·0 ml.	½ fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the oil of coriander and the chloroform in the alcohol, add the tincture of capsicum and the liquid extract of senna, dissolve the sucrose in the mixture, and add sufficient distilled water to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

ELIXIR SIMPLEX

(Elix. Simp.)

Simple Elixir

	Metric	*Imperial*
Tincture of Orange	75 ml.	1½ fl. oz.
Syrup	400 ml.	8 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the tincture of orange with the syrup, and add sufficient distilled water to produce the required volume; add 25 grammes (½ ounce) of purified talc or kaolin, shake well and filter.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

ELIXIR THYMI
(Elix. Thym.)

Elixir of Thyme

	Metric	*Imperial*
Liquid Extract of Thyme ..	125·0 ml.	2½ fl. oz.
Ammonium Bromide	36·6 g.	320 gr.
Distilled Water	83·3 ml.	1 fl. oz. 320 m.
Spirit of Choroform	83·3 ml.	1 fl. oz. 320 m.
Treacle	166·7 ml.	3 fl. oz. 160 m.
Glycerin	125·0 ml.	2½ fl. oz.
Syrup	..to 1000·0 ml.	to 20 fl. oz.

Mix the liquid extract of thyme with the glycerin, treacle and spirit of chloroform; add the ammonium bromide dissolved in the distilled water and finally add sufficient syrup to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

ELIXIR VALERIANÆ
(Elix. Valerian.)

Elixir of Valerian

	Metric	*Imperial*
Simple Tincture of Valerian ..	300·0 ml.	6 fl. oz.
Liquid Extract of Liquorice ..	87·5 ml.	1¾ fl. oz.
Aromatic Elixir	..to 1000·0 ml.	to 20 fl. oz.

Mix, and filter if necessary.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

ELIXIR VALERIANÆ COMPOSITUM
(Elix. Valerian. Co.)

Compound Elixir of Valerian

Synonyms—Elixir Bromidi et Valerianæ Compositum; Compound Elixir of Bromide and Valerian.

	Metric	Imperial
Liquid Extract of Valerian ..	31·2 ml.	300 m.
Potassium Bromide	17·1 g.	150 gr.
Chloral Hydrate	17·1 g.	150 gr.
Liquid Extract of Liquorice ..	20·8 ml.	200 m.
Oil of Orange	4·2 ml.	40 m.
Oil of Lemon	1·0 ml.	10 m.
Oil of Coriander	0·4 ml.	4 m.
Oil of Anise	0·1 ml.	1 m.
Alcohol (90 per cent.)	15·6 ml.	150 m.
Syrup	250·0 ml.	5 fl. oz.
Distilled Water	.. to 1000 0 ml.	to 20 fl. oz.

Dissolve the potassium bromide and chloral hydrate in 600 millilitres (12 fluid ounces) of distilled water, add the liquid extract of valerian, the liquid extract of liquorice, the syrup, and the oils previously dissolved in the alcohol. Add 25 grammes ($\frac{1}{2}$ ounce) of purified talc or kaolin, shake well and filter; pass sufficient distilled water through the filter to produce the required volume.

Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

ELIXIR VIBURNI

(Elix. Viburn.)

Elixir of Black Haw

Synonym—Elixir Viburni Prunifolii.

	Metric	Imperial
Liquid Extract of Black Haw ..	125 ml.	$2\frac{1}{2}$ fl. oz.
Compound Tincture of Cardamom	75 ml.	$1\frac{1}{2}$ fl. oz.
Aromatic Elixir	.. to 1000 ml.	to 20 fl. oz.

Mix, set aside for a few days, and filter.

Dose.– 2 to 8 millilitres ($\frac{1}{2}$ to 2 fluid drachms).

ELIXIR VIBURNI ET HYDRASTIS

(Elix. Viburn. et Hydrast.)

Elixir of Black Haw and Hydrastis

Synonyms—Elixir Viburni Compositum; Compound Elixir of Viburnum Prunifolium.

	Metric	Imperial
Liquid Extract of Black Haw ..	500·0 ml.	10 fl. oz.
Extract of Hydrastis	17·5 g.	153 gr.
Oil of Coriander	5·0 ml.	48 m.
Oil of Caraway	5·0 ml.	48 m.
Glycerin	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the extract of hydrastis and the oils of coriander and caraway in the liquid extract of black haw, and add sufficient glycerin to produce the required volume; filter if necessary.

Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

EMPLASTRA

Plasters

Plasters consist of medicaments incorporated with a plastic, resinous or rubber basis and may be spread upon leather known as "plaster skin," calico, linen, holland, or other suitable material. The plaster so produced is designed to maintain a medicinal substance in close contact with the skin so that by prolonged contact the medicament may be slowly absorbed, to act as a protective, or to assist in the approximation of the edges of wounds.

When spreading plasters, the leather should be previously smoothed with a hot iron, the mass melted over a water-bath and precautions taken to avoid destroying alkaloidal principles or dissipating volatile ingredients by excessive heat. The plaster-mass should be spread thinly upon the supporting material in the proportion of about 10 grains to the square inch, a margin of the material at least three-quarters of an inch wide being left bare to avoid extension of the mass over the edge of the plaster.

Plasters having a basis of plaster of lead, colophony, or soap, require to be warmed before application; those having a rubber basis adhere closely by the warmth of the body. Plasters intended to raise a blister are made soft in order that they may be removed easily from the vesicated surface. They are usually spread upon plaster of lead, and warmed before application to the skin. For use in minor surgery and as protective agents, plasters are prepared spread with a solution of isinglass or rubber, the usual backings being felt of various thicknesses, sometimes called "elephant plaster," linen, muslin, or silk.

In tropical and sub-tropical climates more or less hard soap, colophony, or yellow beeswax may be used for the preparation of plaster-masses to meet conditions of temperature, but the required proportion of the active ingredient must be maintained.

EMPLASTRUM BELLADONNÆ VIRIDE

(Emp. Bellad. Vir.)

Green Belladonna Plaster

	Metric	*Imperial*
Dry Extract of Belladonna ..	250 g.	4 oz.
Chlorophyll	a sufficient	quantity
Rubber Adhesive Plaster, of commerce	to 1000 g.	to 16 oz.

Mix the dry extract of belladonna with 625 grammes (10 ounces) of rubber adhesive plaster previously melted on a water-bath, then add sufficient chlorophyll to produce a bright green colour and sufficient rubber adhesive plaster to produce the required weight.

Green belladonna plaster contains about 0·25 per cent. of the alkaloids of belladonna leaf.

EMPLASTRUM CALEFACIENS
(Emp. Calefac.)
Warming Plaster

	Metric	*Imperial*
Cantharidin	0·2 g.	1½ gr.
Chloroform	20·0 ml.	154 m.
Olive Oil	40·0 ml.	307 m.
Plaster of Colophony	940·0 g.	15 oz. 17½ gr.

Dissolve the cantharidin in the chloroform, add the olive oil, and mix with the plaster of colophony previously melted on a water-bath.

EMPLASTRUM CAPSICI
(Emp. Capsic.)
Plaster of Capsicum

	Metric	*Imperial*
Oleoresin of Capsicum	20 g.	140 gr.
Plaster of Colophony	1000 g.	16 oz.

Mix the oleoresin of capsicum with the melted plaster of colophony.

EMPLASTRUM CAPSICI ELASTICUM
(Emp. Capsic. Elast.)
Rubber Plaster of Capsicum

	Metric	*Imperial*
Oleoresin of Capsicum	20 g.	140 gr.
Rubber Adhesive Plaster, of commerce	1000 g.	16 oz.

Mix the oleoresin of capsicum with the melted rubber adhesive plaster.

EMPLASTRUM FERRI
(Emp. Ferr.)
Iron Plaster

Synonyms—Emplastrum Roborans; Strengthening Plaster.

	Metric	*Imperial*
Brown Precipitated Ferric Oxide	100 g.	1 oz.
Burgundy Pitch	200 g.	2 oz.
Plaster of Lead	800 g.	8 oz.

Melt together the burgundy pitch and plaster of lead, add the brown

precipitated ferric oxide and stir constantly until the mixture stiffens on cooling.

EMPLASTRUM HYDRARGYRI

(Emp. Hydrarg.)

Mercurial Plaster

	Metric	*Imperial*
Mercury	328 g.	5 oz. 108½ gr.
Olive Oil	18 g.	126 gr.
Sublimed Sulphur	2 g.	14 gr.
Plaster of Lead	652 g.	10 oz. 189 gr.

Heat the olive oil with the sulphur until a reddish-brown liquid is obtained; with this solution triturate the mercury until metallic globules are no longer visible; add the plaster of lead, previously melted, and mix.

EMPLASTRUM LYTTÆ

(Emp. Lyttæ)

Plaster of Cantharides

	Metric	*Imperial*
Cantharides, in powder	350 g.	3½ oz.
Yellow Beeswax	200 g.	2 oz.
Lard	200 g.	2 oz.
Colophony	200 g.	2 oz.
Plaster of Soap	50 g.	½ oz.

Melt the colophony, add the plaster of soap and afterwards the yellow beeswax and the lard. Sprinkle the cantharides into the melted mixture and stir until cold.

EMPLASTRUM MENTHOLIS

(Emp. Menthol.)

Plaster of Menthol

	Metric	*Imperial*
Menthol	150 g.	3 oz.
Yellow Beeswax	100 g.	2 oz.
Colophony	750 g.	15 oz.

Melt the beeswax and colophony together; when the mixture has cooled to about 70°, add the menthol and stir until dissolved.

EMPLASTRUM PICIS
(Emp. Pic.)
Plaster of Pitch

Synonym—Poor Man's Plaster.

	Metric	*Imperial*
Burgundy Pitch	520 g.	13 oz.
Olibanum	260 g.	6½ oz.
Colophony	90 g.	2¼ oz.
Yellow Beeswax	90 g.	2¼ oz.
Olive Oil	40 g.	1 oz.
Distilled Water	40 g.	1 oz.

Add the olive oil and the water to the olibanum, burgundy pitch, colophony and beeswax, previously melted together, and evaporate, with constant stirring, to a proper consistence.

EMPLASTRUM SALICYLICUM COMPOSITUM
(Emp. Salicyl. Co.)
Compound Salicylic Plaster

	Metric	*Imperial*
Salicylic Acid	200 g.	3 oz.
Extract of Cannabis	100 g.	1½ oz.
Rubber Adhesive Plaster, of commerce	700 g.	10½ oz.

Dry the extract of cannabis on a water-bath, mix it intimately with the rubber adhesive plaster, previously melted on a water-bath, then add the finely powdered salicylic acid and mix thoroughly.

EMPLASTRUM SALICYLICUM COMPOSITUM FORTIUS
(Emp. Salicyl. Co. Fort.)
Stronger Compound Salicylic Plaster

	Metric	*Imperial*
Salicylic Acid	400 g.	6 oz.
Extract of Cannabis	200 g.	3 oz.
Rubber Adhesive Plaster, of commerce	400 g.	6 oz.

Dry the extract of cannabis on a water-bath, mix it intimately with the rubber adhesive plaster, previously melted on a water-bath, then add the finely powdered salicylic acid and mix thoroughly.

EMPLASTRUM SALICYLICUM ELASTICUM

(Emp. Salicyl. Elast.)

Rubber Salicylic Plaster

	Metric	*Imperial*
Salicylic Acid	100 g.	1½ oz.
Rubber Adhesive Plaster, of commerce	900 g.	13½ oz.

Incorporate the salicylic acid, finely powdered, with the rubber adhesive plaster, previously melted on a water-bath.

Rubber salicylic plasters may also be prepared containing other proportions of salicylic acid, varying from 5 to 40 per cent.

EMPLASTRUM SAPONIS

(Emp. Sap.)

Plaster of Soap

	Metric	*Imperial*
Hard Soap	140 g.	2 oz. 105 gr.
Plaster of Lead	835 g.	13 oz. 157½ gr.
Colophony	25 g.	175 gr.

Melt together the colophony and the plaster of lead at as low a temperature as possible and incorporate the hard soap.

EMPLASTRUM SAPONIS FUSCUM

(Emp. Sap. Fusc.)

Brown Plaster of Soap

Synonym—Emplastrum Cerati Saponis.

	Metric	*Imperial*
Curd Soap, in powder	100 g.	10 oz.
Yellow Beeswax	125 g.	12½ oz.
Olive Oil	200 ml.	20 fl. oz.
Lead Monoxide	150 g.	15 oz.
Vinegar, of commerce	1600 ml.	160 fl. oz.

Boil the vinegar and lead monoxide together, stirring constantly, until the oxide has combined with the acid, then add the soap and boil again until most of the moisture is evaporated; finally add the wax and oil melted together, and stir the whole continuously, maintaining the heat until, by the evaporation of the remaining moisture, the product has acquired the proper consistence for a plaster.

EMULSIONES

Emulsions

An emulsion consists of two liquid phases, one of which is subdivided finely and dispersed in the other, the system being made more or less permanent by the presence of an emulsifying agent (emulgent). It is possible to have two types of emulsions containing water and oil—one in which water or an aqueous solution is the continuous phase (oil-in-water emulsions) and one in which oil or fat is the continuous phase (water-in-oil emulsions). The latter type is rarely employed for internal administration, but is used in the form of liniments, embrocations and ointments. The emulgents for this type may be wool fat, beeswax, or a soap with a divalent or trivalent base, such as calcium or zinc oleate or stearate. External applications are also prepared in the form of oil-in-water emulsions, a soap with a monovalent base, such as sodium or potassium, being used as the emulgent, but the oil-in-water type constitutes the usual form for the internal administration of oils as emulsions. This type is particularly suitable for that purpose since the oil is dispersed in a continuous aqueous medium which may be sweetened and flavoured, and thus any nauseous and greasy characters can be disguised. Moreover, such emulsions may be diluted readily with water. The following considerations apply to this type only, the emulgents commonly used being mucilages of acacia and tragacanth, decoctions of Irish moss or agar, yolk of egg, or saponins.

The following factors govern the rate of creaming in emulsions:—(a) The difference in density between the disperse and continuous phases; the greater the difference, the greater the tendency to cream. (b) The radius of the globules of the disperse phase; the smaller the size of the globules, the less the tendency to cream. For this reason it is important when preparing a hand-made emulsion to make a good primary emulsion before diluting. On a large scale, special emulsion mills or homogenisers are employed which are capable of producing uniform globules of a very much smaller size than can be made in a mortar by hand. As the larger globules of oil are broken up into smaller ones, the viscosity of the emulsion as a whole increases and if the quantity of gum in the formula is that required for a hand-made emulsion, the constituents when passed through a mill may form an unworkable mass because of its extreme viscosity. (c) The viscosity of the continuous phase; the greater the viscosity, the less the tendency to cream. Decoction of chondrus or mucilage of tragacanth is often included in the formulæ of acacia emulsions for this purpose. (d) The ratio of disperse to continuous phase; as the proportion of the former increases so the tendency to cream will decrease. Thus, an emulsion containing fifty per cent. of oil will require proportionately less gum than one containing only twenty-five per cent.

The method of preparation of emulsions depends upon the quantity of material to be manipulated and upon the emulgent employed. Small quantities may be produced by brisk and light trituration using a

flat-headed pestle in an ample-sized mortar. The first object should be the production of a concentrated primary emulsion and dilution should not be attempted before this is accomplished. The procedure will vary with different emulgents. When preparing an emulsion of the British Pharmaceutical Codex with the aid of a homogenising machine, the quantity of emulsifying agent specified in the formula may be reduced if necessary, provided that the final product contains the correct proportions of other constituents and that its viscosity as a whole is approximately equal to that of one made from the formula by hand in a mortar. In cases where a preservative is required, benzoic acid, 0·4 per cent., or a suitable derivative of benzoic acid or salicylic acid, may be added.

The following are the principal substances employed as emulsifying agents:—

Powdered Acacia is generally employed in preference to mucilage of acacia and is probably the best emulgent for emulsions of the oil-in-water type for internal use. In making the primary emulsion, one part of powdered gum is required for (a) every four parts of a fixed oil, provided the percentage of fixed oil in the finished product is not less than twenty-five per cent., (b) every two parts of a volatile oil, soft paraffin, or an oleo-resin such as copaiba, or extract of male fern, (c) every one part of a wax such as spermaceti. The quantity of water required is always exactly twice the quantity of gum used. Measure the oil and drain it into the dry mortar, add the powdered gum, mix quickly and immediately add the water; triturate very lightly and briskly until complete emulsification ensues. It is important that the powdered gum and oil should not be left in contact for longer than is necessary to mix them. For the emulsification of soft paraffin and waxes, a warm mortar and warm water should be used.

Decoction of Chondrus emulsions are prone to fermentation and separation unless inhibiting substances are added. Decoction of chondrus is a more efficient emulsifying agent when allowed to stand for about eighteen hours before use. Six to eight parts of the decoction, set to the consistence of a thin jelly, suffice for the emulsification of eight parts of oil. The oil should be added in portions, shaking or beating strongly by means of any suitable machine after each addition.

Yolk of Egg possesses approximately double the emulsifying power of powdered acacia, volume for weight. The yolk of an egg of average size measures from four to five fluid drachms and suffices for the emulsification of at least four fluid ounces of fixed oil or two fluid ounces of volatile oil. Oils should be added gradually to the requisite quantity of yolk of egg, freed from albumen and previously triturated in a mortar to a perfectly smooth consistence, distilled water being added in small portions if the emulsion thickens inconveniently. Emulsions prepared with yolk of egg are not so liable to separate upon the addition of alcoholic preparations, acid salts, diluted acids, glycerin, syrups or large quantities of soluble salts as are those prepared with acacia. Yolk

of egg is, therefore, a suitable agent for the preparation of turpentine liniments containing acetic acid. Yolk of egg may be preserved by mixing it with an equal volume of glycerin and by this means it can be kept in a suitable condition ready for use; the emulsifying power of the mixture is approximately equivalent to that of powdered acacia. If desired, flavouring agents such as saccharin or aromatic oils may be incorporated with the yolk of egg before admixture with the glycerin.

Mucilage of Tragacanth produces coarse emulsions and is, therefore, rarely used except, in conjunction with other emulsifying agents, to increase the viscosity and prevent creaming.

Saponins, generally in the form of the tinctures and liquid extracts of quillaia and senega, are sometimes employed as emulgents, usually for emulsions intended for external application from which it is desirable to exclude mucilaginous matter. In consequence of their therapeutic activity they should only be employed for preparations intended for internal use when so ordered. These agents may be employed with advantage for the emulsification of small quantities of oils or for preventing the complete separation of oil when adding alcoholic solutions of volatile oils to aqueous liquids. They are unsatisfactory for preparations containing appreciable quantities of oil since they do not make the continuous phase sufficiently viscous to prevent creaming. Tragacanth can be added with advantage for this purpose. One part of tincture of quillaia will emulsify eight parts of fixed oil or one part of volatile oil. The requisite quantity of tincture of quillaia should be diluted with two parts of water and thoroughly shaken in an ample-sized bottle with the oil until emulsification ensues. Saponin may be used with advantage in place of tincture of quillaia for the emulsification of fixed oils in creams or lotions. Four grains of saponin, dissolved in 120 minims of distilled water and shaken with 1 fluid ounce of fixed oil, produces a satisfactory emulsion. Emulsions made with quillaia or saponin are not affected by the addition of substances liable to 'crack' acacia emulsions.

EMULSIO ACRIFLAVINÆ

(Emuls. Acriflavin.)

Emulsion of Acriflavine

	Metric	*Imperial*
Acriflavine	1 g.	8¾ gr.
White Beeswax	41 g.	360 gr.
Distilled Water	250 ml.	5 fl. oz.
Liquid Paraffin	750 ml.	15 fl. oz.

Melt the white beeswax in the liquid paraffin, and add with constant stirring a warm solution of the acriflavine in the distilled water; stir until cold.

EMULSIO CHLOROFORMI

(Emuls. Chlorof.)

Emulsion of Chloroform

	Metric	*Imperial*
Chloroform	50 ml.	1 fl. oz.
Tincture of Quillaia	20 ml.	192 m.
Mucilage of Tragacanth	50 ml.	1 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Shake the chloroform with the tincture of quillaia, add the mucilage of tragacanth, shake well and add gradually sufficient distilled water to produce the required volume, shaking well after each addition.

Dose.– 0·3 to 2 millilitres (5 to 30 minims).

EMULSIO MENTHÆ PIPERITÆ

(Emuls. Menth. Pip.)

Emulsion of Peppermint

	Metric	*Imperial*
Oil of Peppermint	100 ml.	2 fl. oz.
Tincture of Quillaia	50 ml.	1 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Add the oil of peppermint to the tincture of quillaia, shake, and add the distilled water gradually, shaking well after each addition.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

EMULSIO OLEI ARACHIS

(Emuls. Ol. Arach.)

Emulsion of Arachis Oil

Synonym—Marylebone Cream (Improved).

	Metric	*Imperial*
Arachis Oil	475·0 ml.	9½ fl. oz.
Solution of Irradiated Ergosterol	25·0 ml.	½ fl. oz.
Acacia, in powder	125·0 g.	2½ oz.
Tragacanth, in powder	6·9 g.	60 gr.
Benzoic Acid	0·6 g.	5 gr.
Elixir of Saccharin	4·2 ml.	40 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Triturate quickly the arachis oil and solution of irradiated ergosterol with the acacia and tragacanth; without delay add in one quantity 250 millilitres (5 fluid ounces) of distilled water and stir briskly until emulsified. Add the elixir of saccharin, the benzoic acid dissolved in hot distilled water, and sufficient distilled water to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

EMULSIO OLEI MORRHUÆ
(Emuls. Ol. Morrh.)
Emulsion of Cod-liver Oil

	Metric	*Imperial*
Cod-liver Oil	500·0 ml.	10 fl. oz.
Acacia, in powder	125·0 g.	2½ oz.
Tragacanth, in powder	6·9 g.	60 gr.
Oil of Bitter Almond without Hydrocyanic Acid	1·0 ml.	10 m.
Elixir of Saccharin	2·1 ml.	20 m.
Chloroform	2·1 ml.	20 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Triturate quickly the cod-liver oil with the acacia and tragacanth; without delay add in one quantity 250 millilitres (5 fluid ounces) of distilled water and stir briskly until emulsified. Add the elixir of saccharin, oil of bitter almond, chloroform and sufficient distilled water to produce the required volume.

Dose.– 8 to 30 millilitres (¼ to 1 fluid ounce).

EMULSIO OLEI MORRHUÆ CUM GLYCEROPHOSPHATIBUS
(Emuls. Ol Morrh. c Glycerophosph.)
Emulsion of Cod-liver Oil with Glycerophosphates

	Metric	*Imperial*
Cod-liver Oil	500·0 ml.	10 fl. oz.
Iron Glycerophosphate	4·6 g.	40 gr.
Solution of Sodium Glycerophosphate	9·1 g.	80 gr.
Solution of Potassium Glycerophosphate	9·1 g.	80 gr.
Glycerophosphoric Acid ..	10·4 ml.	100 m.
Calcium Glycerophosphate ..	9·1 g.	80 gr.
Magnesium Glycerophosphate ..	4·6 g.	40 gr.
Acacia, in powder	125·0 g.	2½ oz.
Tragacanth, in powder	6·9 g.	60 gr.
Elixir of Saccharin	4·1 ml.	40 m.
Tincture of Benzoin	10·4 ml.	100 m.
Chloroform	1·6 ml.	15 m.
Oil of Bitter Almond without Hydrocyanic Acid	1·0 ml.	10 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the iron glycerophosphate in 300 millilitres (6 fluid ounces) of distilled water, add the solution of sodium glycerophosphate, the solution of potassium glycerophosphate and the glycerophosphoric acid, and suspend the calcium and magnesium glycerophosphates in

the mixture. Triturate quickly the cod-liver oil with the acacia and tragacanth; without delay add in one quantity the glycerophosphates suspension and stir briskly until emulsified. Add the other ingredients and sufficient distilled water to produce the required volume.

Dose.– 8 to 30 millilitres (¼ to 1 fluid ounce).

EMULSIO OLEI MORRHUÆ CUM HYPOPHOSPHITIBUS

(Emuls. Ol. Morrh. c. Hypophosph.)

Emulsion of Cod-liver Oil with Hypophosphites

Synonyms—Emulsio Olei Morrhuæ Composita; Compound Emulsion of Cod-liver Oil.

	Metric	*Imperial*
Cod-liver Oil	500·0 ml.	10 fl. oz.
Sodium Hypophosphite	18·3 g.	160 gr.
Calcium Hypophosphite	18·3 g.	160 gr.
Acacia, in powder	125·0 g.	2½ oz.
Tragacanth, in powder	6·9 g.	60 gr.
Elixir of Saccharin	4·1 ml.	40 m.
Tincture of Benzoin	10·4 ml.	100 m.
Chloroform	1·6 ml.	15 m.
Oil of Bitter Almond without Hydrocyanic Acid	1·0 ml.	10 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Triturate quickly the cod-liver oil with the acacia and tragacanth; without delay add in one quantity a solution of the hypophosphites in 250 millilitres (5 fluid ounces) of distilled water and stir briskly until emulsified. Add the other ingredients and sufficient distilled water to produce the required volume.

Dose.– 8 to 30 millilitres (¼ to 1 fluid ounce).

EMULSIO OLEI MORRHUÆ ET CREOSOTI

(Emuls. Ol. Morrh. et Creosot.)

Emulsion of Cod-liver Oil and Creosote

	Metric	*Imperial*
Creosote	8·3 ml.	80 m.
Cod-liver Oil	333·3 ml.	6 fl. oz. 320 m.
Acacia, in powder	150·0 g.	3 oz.
Tragacanth, in powder	10·0 g.	87½ gr.
Chloroform	1·2 ml.	12 m.
Tincture of Benzoin	25·0 ml.	½ fl. oz.
Oil of Pumilio Pine	0·3 ml.	3 m.
Glycerin	100·0 ml.	2 fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Triturate quickly the cod-liver oil and creosote with the acacia and tragacanth; without delay add in one quantity 200 millilitres (4 fluid ounces) of distilled water and stir briskly until emulsified. Add the oil of pumilio pine, chloroform, tincture of benzoin, glycerin and sufficient distilled water to produce the required volume.

Dose.– 8 to 30 millilitres (½ to 1 fluid ounce).

EMULSIO OLEI OLIVÆ

(Emuls. Ol. Oliv.)

Emulsion of Olive Oil

	Metric	*Imperial*
Olive Oil	500·0 ml.	10 fl. oz.
Acacia, in powder	125·0 g.	2½ oz.
Tragacanth, in powder	6·9 g.	60 gr.
Elixir of Saccharin	2·1 ml.	20 m.
Tincture of Benzoin	10·4 ml.	100 m.
Chloroform	2·1 ml.	20 m.
Oil of Bitter Almond without Hydrocyanic Acid	1·0 ml.	10 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Triturate quickly the olive oil with the acacia and tragacanth; without delay add in one quantity 250 millilitres (5 fluid ounces) of distilled water and stir briskly until emulsified. Add the other ingredients and sufficient distilled water to produce the required volume.

Dose.– 8 to 30 millilitres (½ to 1 fluid ounce).

EMULSIO OLEI RICINI AROMATICI

(Emuls. Ol. Ricin. Aromat.)

Emulsion of Aromatic Castor Oil

	Metric	*Imperial*
Aromatic Castor Oil ..	300 ml.	6 fl. oz.
Acacia, in powder	75 g.	1½ oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Triturate quickly the aromatic castor oil with the acacia; without delay add in one quantity 150 millilitres (3 fluid ounces) of distilled water and stir briskly until emulsified. Gradually add sufficient distilled water to produce the required volume.

Dose.– 30 to 60 millilitres (1 to 2 fluid ounces).

EMULSIO PARAFFIN. LIQUIDI ALKALINA
(Emuls. Paraff. Liq. Alk.)
Alkaline Emulsion of Liquid Paraffin

	Metric	*Imperial*
Mixture of Magnesium Hydroxide	250 ml.	5 fl. oz.
Emulsion of Liquid Paraffin with Agar	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EMULSIO PARAFFINI LIQUIDI COMPOSITA
(Emuls. Paraff. Liq. Co.)
Compound Emulsion of Liquid Paraffin

Synonym—Emulsion of Liquid Paraffin with Agar and Phenolphthalein.

	Metric	*Imperial*
Phenolphthalein	3·4 g.	30 gr.
Emulsion of Liquid Paraffin with Agar	to 1000·0 ml.	to 20 fl. oz.

Reduce the phenolphthalein to fine powder and mix it with the emulsion.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EMULSIO PARAFFINI LIQUIDI CUM AGAR
(Emuls. Paraff. Liq. c. Agar)
Emulsion of Liquid Paraffin with Agar

	Metric	*Imperial*
Liquid Paraffin	500·0 ml.	10 fl. oz.
Agar	7·5 g.	66 gr.
Acacia, in powder	25·0 g.	½ oz.
Tragacanth, in powder	2·5 g.	22 gr.
Benzoic Acid	1·7 g.	15 gr.
Vanillin, in powder	0·5 g.	4½ gr.
Oil of Lemon	1·0 ml.	10 m.
Glycerin	50·0 ml.	1 fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Add the agar to 400 millilitres (8 fluid ounces) of the distilled water and boil gently until dissolved; if necessary, replace the water lost by

evaporation, then dissolve the benzoic acid in the mucilage and strain while hot. Warm the liquid paraffin and triturate it with the acacia, tragacanth and vanillin previously mixed; without delay add the strained mucilage in one quantity while hot and stir briskly until cold. Then add the glycerin, oil of lemon and sufficient distilled water to produce the required volume.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EMULSIO PARAFFINI LIQUIDI CUM GLYCEROPHOSPHATIBUS

(Emuls. Paraff. Liq. c. Glycerophosph.)

Emulsion of Liquid Paraffin with Glycerophosphates

Synonyms—Emulsio Petrolei cum Glycerophosphatibus; Emulsion of Petroleum with Glycerophosphates.

	Metric	*Imperial*
Liquid Paraffin	500·0 ml.	10 fl. oz.
Iron Glycerophosphate	4·5 g.	40 gr.
Solution of Sodium Glycerophosphate	9·1 g.	80 gr.
Solution of Potassium Glycerophosphate	9·1 g.	80 gr.
Glycerophosphoric Acid	10·4 ml.	100 m.
Calcium Glycerophosphate	9·1 g.	80 gr.
Magnesium Glycerophosphate	4·5 g.	40 gr.
Acacia, in powder	125·0 g.	2½ oz.
Tragacanth, in powder	6·9 g.	60 gr.
Elixir of Saccharin	2·1 ml.	20 m.
Chloroform	2·1 ml.	20 m.
Vanillin, in powder	0·03 g.	¼ gr.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the iron glycerophosphate in 300 millilitres (6 fluid ounces) of distilled water, add the solution of sodium glycerophosphate, the solution of potassium glycerophosphate and the glycerophosphoric acid, and suspend the calcium and magnesium glycerophosphates in the mixture. Triturate quickly the liquid paraffin with the acacia, tragacanth and vanillin; without delay add in one quantity the glycerophosphates suspension and stir briskly until emulsified. Add the other ingredients and sufficient distilled water to produce the required volume.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EMULSIO PARAFFINI LIQUIDI CUM HYPOPHOSPHITIBUS

(Emuls. Paraff. Liq. c. Hypophosph.)

Emulsion of Liquid Paraffin with Hypophosphites

Synonyms—Emulsio Petrolei cum Hypophosphitibus; Emulsion of Petroleum with Hypophosphites.

	Metric	*Imperial*
Liquid Paraffin	500·0 ml.	10 fl. oz.
Calcium Hypophosphite	18·3 g.	160 gr.
Sodium Hypophosphite	18·3 g.	160 gr.
Acacia, in powder	125·0 g.	2½ oz.
Tragacanth, in powder	10·0 g.	87½ gr.
Oil of Cinnamon	2·0 ml.	20 m.
Elixir of Saccharin	3·2 ml.	30 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Triturate quickly the liquid paraffin and the oil of cinnamon with the acacia and tragacanth; without delay add in one quantity a solution of the hypophosphites in 250 millilitres (5 fluid ounces) of distilled water and stir briskly until emulsified. Add the elixir of saccharin and sufficient distilled water to produce the required volume.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EMULSIO PARAFFINI LIQUIDI ET KAOLINI

(Emuls. Paraff. Liq. et Kaolin.)

Emulsion of Liquid Paraffin and Kaolin

	Metric	*Imperial*
Liquid Paraffin	250·0 ml.	5 fl. oz.
Acacia, in powder	34·3 g.	300 gr.
Tragacanth, in powder	4·3 g.	37½ gr.
Kaolin	187·5 g.	3¾ oz.
Chloroform Water	to 1000·0 ml.	to 20 fl. oz.

Triturate quickly the liquid paraffin with the acacia and tragacanth; without delay add 125 millilitres (2½ fluid ounces) of chloroform water and stir briskly until emulsified. Gradually add a suspension of the kaolin in 500 millilitres (10 fluid ounces) of chloroform water and sufficient chloroform water to produce the required volume.

Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

ENEMATA

Enemas

Enemas are aqueous or oily solutions or suspensions intended for rectal injection. They are given for their anthelmintic, nutritive,

purgative, sedative, or stimulating effects, or for X-ray examination of the lower bowel. They should be freshly prepared and any solid substances or oils contained in them should be uniformly suspended. In the absence of specific instructions for preparing an enema the following strengths and quantities may be considered suitable for administration to adults:—

Enema Asafœtidæ.—Tincture of asafetida, from 6 to 12 per cent. v/v, in mucilage of starch. Dose.– 120 millilitres (4 fluid ounces).

Enema Bismuthi.—Bismuth carbonate or subchloride, from 10 to 30 per cent. w/v, in mucilage of starch. Dose.– 600 millilitres (20 fluid ounces).

Enema Chloralis Hydratis.—Chloral hydrate, 1 to 3 per cent. w/v, in mucilage of starch. Dose.– 120 millilitres (4 fluid ounces).

Enema Dextrosi.—Dextrose, 10 per cent. w/v, in water or peptonised milk. Dose.– 120 millilitres (4 fluid ounces).

Enema Glucosi Liquidi.—Liquid glucose, 10 per cent. w/v, in water or peptonised milk. Dose.– 120 millilitres (4 fluid ounces).

Enema Glycerini.—Glycerin, undiluted. Dose.– 4 to 16 millilitres (1 to 4 fluid drachms). Glycerin, 20 to 50 per cent. v/v, in water or mucilage of starch. Dose.– 15 to 60 millilitres (½ to 2 fluid ounces).

Enema Magnesii Sulphatis.—Magnesium sulphate, 5 per cent. w/v, in mucilage of starch, with 10 per cent. v/v of olive oil. Dose.– 600 millilitres (20 fluid ounces).

Enema Olei Olivæ.—Olive oil, undiluted. Dose.– 150 to 600 millilitres (5 to 20 fluid ounces). Olive oil, 20 per cent. v/v, in mucilage of starch. Dose.– 600 millilitres (20 fluid ounces).

Enema Olei Ricini.—Castor oil, 10 per cent. v/v, in a 5 per cent. w/v aqueous solution of soft soap. Dose.– 600 millilitres (20 fluid ounces).

Enema Opii.—Tincture of opium, 0·5 to 6 per cent. v/v, in mucilage of starch. Dose.– 60 to 120 millilitres (2 to 4 fluid ounces).

Enema Ovi.—1 or 2 yolks of egg in peptonised beef tea. Dose.– 120 millilitres (4 fluid ounces).

Enema Pancreatini.—Solution of pancreatin, 6·5 per cent. v/v, in equal parts of milk and beef tea. Dose.– 120 millilitres (4 fluid ounces).

Enema Paraldehydi.—Paraldehyde, 4 millilitres (60 minims) per stone body weight, with 5 per cent. w/v of dextrose, in normal saline.

Enema Potassii Bromidi.—Potassium bromide, 1 per cent. w/v, with acetylsalicylic acid, 0·5 per cent. w/v, and mucilage of tragacanth, in normal saline. Dose.– 150 millilitres (5 fluid ounces).

Enema Quassiæ.—Fresh infusion of quassia. Dose.– 600 millilitres (20 fluid ounces).

Enema Saponis.—Soft soap, 5 per cent. w/v, in water. Dose.– 600 millilitres (20 fluid ounces).

Enema Sodii Chloridi.—Sodium chloride, from 2·5 to 5 per cent. w/v, in mucilage of starch or in a 5 per cent. w/v aqueous solution of soft soap. Dose.– 600 millilitres (20 fluid ounces). Hypertonic.—Sodium chloride, 4 per cent. w/v, in water. Normal.—Sodium chloride, 0·9 per cent. w/v, in water.

Enema Terebinthinæ.—Oil of turpentine, from 2·5 to 5 per cent. v/v, in mucilage of starch or in a 5 per cent. w/v aqueous solution of soft soap. Dose.– 600 millilitres (20 fluid ounces).

EXTRACTA

Extracts

Extracts are preparations containing the active principles of crude drugs with the minimum amount of inert matter, and are prepared by extraction with suitable solvents, such as water, alcohol, or ether. They may be of two general types—liquid extracts and solid extracts.

Liquid Extracts are usually of such a strength that one part by volume of the preparation is equivalent to one part by weight of the crude drug. If, however, the active principle is of a potent nature and permits of a chemical or biological assay, the liquid extract is then adjusted to a definite strength which represents the content of active principle of an average sample of the crude drug.

Solid Extracts vary in consistency according to the degree of concentration. Evaporation may be stopped when the extractive is of the nature of a soft mass (soft extract), or continued to dryness (dry extract).

Soft Extracts possess certain disadvantages. It is difficult to define what the exact consistency of a "soft" extract should be, and because of this, variations occur in the products. During storage, soft extracts generally tend to harden, forming tough masses which are difficult to handle on the dispensing counter. Moreover, when the active principle is of a potent nature and capable of being assayed, it is very difficult to find a suitable diluent with which to adjust the preparation to a standard strength. These factors tend to produce an appreciable variation in strength and, for this reason, soft extracts are being replaced gradually by dry extracts.

Dry Extracts are generally preferred to soft extracts because they are more readily handled in dispensing, less variable in strength,

and less liable to decomposition during storage. They are usually produced by evaporating the extractive to dryness under reduced pressure and, if the active principle is of a potent nature, assaying and adjusting to a standard by dilution with a substance such as lactose or calcium phosphate. The standard strengths set up for potent dry extracts bear no relation to the crude drug, but are determined by the dose, the strength being so adjusted that the maximum dose shall not be less than 0·06 gramme (1 grain). In order to obtain this, it may happen that the extract is actually weaker than the crude drug itself, as in the case of extract of strophanthus. Lactose forms an ideal diluent for dry extracts unless the dry extractive is deliquescent, when an absorbent diluent such as calcium phosphate is used and the preparation stored in well-closed containers. It is advisable to store all types of extracts in this manner and also to protect them from light.

EXTRACTUM AGROPYRI LIQUIDUM

(Ext. Agropyr. Liq.)

Liquid Extract of Couch Grass

Synonym—Liquid Extract of Triticum.

	Metric	*Imperial*
Couch Grass, cut small	1000 g.	20 oz.
Distilled Water	10000 ml.	200 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Boil the couch grass with the distilled water for thirty minutes and strain; evaporate to 750 millilitres (15 fluid ounces), cool, add sufficient of the alcohol to produce the required volume and filter.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

EXTRACTUM ALETRIDIS LIQUIDUM

(Ext. Aletr. Liq.)

Liquid Extract of Aletris

	Metric	*Imperial*
Aletris, in moderately fine powder	1000 g.	20 oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the aletris with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

EXTRACTUM ALOES

(Ext. Aloes)

Extract of Aloes

	Metric	*Imperial*
Aloes	1000 g.	16 oz.
Distilled Water	10000 ml.	160 fl. oz.

Add the aloes in small fragments to the boiling distilled water, stir well until thoroughly mixed and set the mixture aside for twenty-four hours; decant, strain, and evaporate the strained liquid to dryness at a temperature not exceeding 60°.

Dose.– 0·06 to 0·25 gramme (1 to 4 grains).

EXTRACTUM ANTHEMIDIS

(Ext. Anthem.)

Extract of Chamomile

	Metric	*Imperial*
Chamomile	1000 g.	16 oz.
Oil of Chamomile	2 ml.	15½ m.
Distilled Water	10000 ml.	160 fl. oz.

Boil the chamomile with the distilled water until the volume is reduced to one-half; strain, press the marc, filter, and evaporate the filtrate to the consistence of a soft extract, adding the oil of chamomile towards the end of the process.

Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

EXTRACTUM ANTHEMIDIS LIQUIDUM

(Ext. Anthem. Liq.)

Liquid Extract of Chamomile

	Metric	*Imperial*
Chamomile, in moderately coarse powder	1000 g.	20 oz.
Alcohol (70 per cent)	to 1000 ml.	to 20 fl. oz.

Exhaust the chamomile with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

EXTRACTUM APII LIQUIDUM

(Ext. Apii Liq.)

Liquid Extract of Celery

	Metric	*Imperial*
Celery, in moderately fine powder	1000 g.	20 oz.
Alcohol (95 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the celery with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion, and add sufficient of the alcohol to produce the required volume. Allow to stand for four days and separate any excess of oil by decantation, or by filtration through a filter moistened with alcohol.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

EXTRACTUM AURANTII LIQUIDUM

(Ext. Aurant. Liq.)

Liquid Extract of Orange

	Metric	*Imperial*
Dried Bitter-Orange Peel, cut small	1000 g.	20 oz.
Alcohol (70 per cent.)	1500 ml.	30 fl. oz.

Macerate the dried bitter-orange peel with 1000 millilitres (20 fluid ounces) of the alcohol in a covered vessel for five days, shaking occasionally, and press out the liquid. Add the remainder of the alcohol to the pressed marc, macerate for two days and press out the liquid. Mix the two liquids and filter.

Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

EXTRACTUM BELÆ LIQUIDUM

(Ext. Belæ Liq.)

Liquid Extract of Bael

	Metric	*Imperial*
Bael	1000 g.	20 oz.
Chloroform Water	15000 ml.	300 fl. oz.
Chloroform	2 ml.	20 m.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Bruise the bael and macerate for twelve hours with 5000 millilitres (100 fluid ounces) of the chloroform water; pour off and reserve the clear liquid; repeat the maceration a second and a third time for one hour in each case, using for each maceration 5000 millilitres (100 fluid ounces) of the chloroform water; press the marc and strain the mixed

liquids through flannel. Evaporate to 750 millilitres (15 fluid ounces), cool, add the chloroform dissolved in sufficient alcohol (90 per cent.) to produce the required volume, and filter.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

EXTRACTUM BELLADONNÆ VIRIDE

(Ext. Bellad. Vir.)

Green Extract of Belladonna

	Metric	*Imperial*
Belladonna Leaf, in moderately coarse powder	1000 g.	16 oz.
Alcohol (70 per cent.)	a sufficient quantity	
Alcohol (25 per cent.)	a sufficient quantity	
Liquid Glucose	a sufficient quantity	

Moisten the belladonna leaf with 750 millilitres (12 fluid ounces) of alcohol (70 per cent.), pack in a percolator and allow percolation to proceed, using alcohol (70 per cent.) as menstruum, until 2000 millilitres (32 fluid ounces) of percolate has been collected. Continue percolation with alcohol (25 per cent.) until the drug is exhausted. Evaporate the mixed percolates to the consistence of a soft extract and determine the proportion of alkaloid in the product. Dilute the remainder of the product with liquid glucose, or continue evaporation, in order to produce an extract of the required strength.

Standard.—Green extract of belladonna, determined by the method of the British Pharmacopœia for Extractum Belladonnæ Siccum, contains not less than 0·95 per cent. and not more than 1·05 per cent. of the alkaloids of belladonna calculated as hyoscyamine.

Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

In making this preparation the alcohols may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strengths, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

Green extract of belladonna replaces the unstandardised Extractum Belladonnæ Viride, B.P. 1898.

EXTRACTUM BUCHU LIQUIDUM

(Ext. Buchu Liq.)

Liquid Extract of Buchu

	Metric	*Imperial*
Buchu, in moderately fine powder	1000 g.	20 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Pack the buchu in a percolator, saturate it with alcohol, allow to stand for forty-eight hours, and then percolate until exhausted. Reserve the first 850 millilitres (17 fluid ounces) of percolate, evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

EXTRACTUM CANNABIS
(Ext. Cannab.)
Extract of Cannabis

	Metric	*Imperial*
Cannabis, in coarse powder ..	1000 g.	16 oz.
Alcohol (90 per cent.)	a sufficient quantity	

Exhaust the cannabis by percolation with the alcohol and evaporate to a soft extract.

Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

This extract replaces the Extractum Cannabis Indicæ of the British Pharmacopœia, 1914, which was prepared in the same way from Indian cannabis (Cannabis Indica).

EXTRACTUM CAULOPHYLLI LIQUIDUM
(Ext. Cauloph. Liq.)
Liquid Extract of Caulophyllum

Synonym—Liquid Extract of Blue Cohosh.

	Metric	*Imperial*
Caulophyllum, in moderately fine powder	1000 g.	20 oz.
Alcohol (70 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the caulophyllum with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

EXTRACTUM CEREI LIQUIDUM
(Ext. Cerei Liq.)
Liquid Extract of Cereus

Synonym—Extractum Cacti Grandiflori Liquidum.

	Metric	*Imperial*
Cereus, in moderately fine powder	1000 g.	20 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Pack the cereus in a percolator, saturate it with alcohol, allow to stand for forty-eight hours, and then percolate until exhausted. Reserve the first 850 millilitres (17 fluid ounces) of percolate, evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 0·06 to 0·6 millilitre (1 to 10 minims).

EXTRACTUM COCÆ LIQUIDUM
(Ext. Cocæ Liq.)
Liquid Extract of Coca

Synonym—Miscible Liquid Extract of Coca.

	Metric	*Imperial*
Coca, in moderately coarse powder	1000 g.	20 oz.
Alcohol (60 per cent.)	a sufficient quantity	

Exhaust the coca with the alcohol by percolation. Evaporate the percolate at a temperature not exceeding 80° until the volume is reduced to 500 millilitres (10 fluid ounces). Pour off from the residue as much of the clear liquid as possible, wash the residue with 100 millilitres (2 fluid ounces) of distilled water, mix the washings with the clear liquid and determine the proportion of alkaloid in the product. Evaporate further or dilute the product with more of the alcohol so as to produce a liquid extract of the required strength.

Standard.—Liquid extract of coca contains not less than 0·45 per cent. and not more than 0·55 per cent. w/v of ether-soluble alkaloids, calculated as cocaine.

Assay.—Shake 10 millilitres with 2 millilitres of dilute solution of ammonia and 25 millilitres of ether. Separate and shake the aqueous layer with 20 millilitres followed by 10 millilitres of ether. Extract the mixed ethereal solutions with a mixture of 5 millilitres of water and 5 millilitres of N/1 sulphuric acid followed by a mixture of 9 millilitres of water and 1 millilitre of N/1 sulphuric acid. To the combined acid liquids add 20 millilitres of ether and make just alkaline with dilute solution of ammonia. Separate the aqueous layer and extract it with two successive quantities of 15 millilitres of ether. Distil off the ether and dissolve the residue in 10 millilitres of N/10 sulphuric acid. Titrate the solution with N/10 sodium hydroxide using methyl red as indicator; each millilitre of N/10 sulphuric acid is equivalent to 0·0303 gramme of ether-soluble alkaloids, calculated as cocaine.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

EXTRACTUM COLCHICI ACETICUM

(Ext. Colch. Acet.)

Acetic Extract of Colchicum

	Metric	*Imperial*
Colchicum Corm, fresh	950 g.	9½ oz.
Acetic Acid	50 ml.	½ fl. oz.

Crush the corm, add the acetic acid, and press out the juice; allow the feculence to subside, and heat the clear liquid to 100°; strain through flannel and evaporate to a soft extract.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

Acetic extract of colchicum is an unstandardised extract and its use should, where possible, be discontinued in favour of Extractum Colchici Siccum.

EXTRACTUM CONII

(Ext. Conii)

Extract of Conium

Synonym—Extract of Hemlock.

	Metric	*Imperial*
Conium Leaf	1000 g.	16 oz.

Bruise the conium leaf in a stone mortar, press out the juice, heat it gradually to 55°, and separate the green colouring matter by means of a calico filter. Heat the strained liquid to 95° and again filter. Evaporate the filtrate on a water-bath to a thin syrup; then add to it the green colouring matter previously separated and passed through a hair sieve and, mixing thoroughly, continue the evaporation at a temperature not exceeding 60° to a soft extract.

Dose.– 0·12 to 0·4 gramme (2 to 6 grains).

EXTRACTUM CONVALLARIÆ LIQUIDUM

(Ext. Convallar. Liq.)

Liquid Extract of Convallaria

	Metric	*Imperial*
Convallaria, in moderately fine powder	1000 g.	20 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the convallaria with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

EXTRACTUM COTO LIQUIDUM

(Ext. Coto Liq.)

Liquid Extract of Coto

	Metric	*Imperial*
Coto, in moderately fine powder	1000 g.	20 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the coto with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

EXTRACTUM CUBEBÆ LIQUIDUM

(Ext. Cubeb. Liq.)

Liquid Extract of Cubeb

	Metric	*Imperial*
Cubeb, in moderately coarse powder	1000 g.	20 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the cubeb with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

EXTRACTUM DAMIANÆ

(Ext. Damian.)

Extract of Damiana

	Metric	*Imperial*
Damiana, in moderately fine powder	1000 g.	16 oz.
Alcohol (60 per cent.)	a sufficient quantity	
Distilled Water	a sufficient quantity	

Mix the damiana with 2500 millilitres (40 fluid ounces) of the alcohol and macerate in a closed vessel for forty-eight hours; then transfer to a percolator, and when the liquid ceases to pass, continue the percolation, using distilled water, until 2500 millilitres (40 fluid ounces) of liquid has been collected. Evaporate the percolate to a soft extract.

Dose.– 0·3 to 0·6 gramme (5 to 10 grains).

In making this preparation the alcohol (60 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM DAMIANÆ LIQUIDUM

(Ext. Damian. Liq.)

Liquid Extract of Damiana

	Metric	*Imperial*
Damiana, in moderately fine powder	1000 g.	20 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the damiana with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

EXTRACTUM EPHEDRÆ LIQUIDUM

(Ext. Ephed. Liq.)

Liquid Extract of Ephedra

	Metric	*Imperial*
Ephedra, in moderately coarse powder	1000 g.	20 oz.
Alcohol (70 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the ephedra with the alcohol by percolation, reserving the first 750 millilitres (15 fluid ounces) of percolate. Evaporate the remainder of the percolate, under reduced pressure at a temperature not exceeding 40°, to a syrupy consistence, dissolve it in the reserved portion, and add sufficient of the alcohol to produce the required volume.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

EXTRACTUM ERGOTÆ

(Ext. Ergot.)

Extract of Ergot

	Metric	*Imperial*
Ergot, in moderately fine powder	1000 g.	16 oz.
Sulphuric Acid	a sufficient quantity	
Alcohol (50 per cent.)	a sufficient quantity	
Liquid Glucose	a sufficient quantity	

Percolate the ergot with light petroleum (boiling-point, 40° to 50°) until 1 millilitre of the percolate leaves not more than a barely perceptible film when evaporated in a glass basin. Dry the powder by exposure to air, completing the drying if necessary in a current of air at a temperature not exceeding 40°. Again reduce it to powder, moisten it with a sufficient quantity of a mixture of 4 volumes of sulphuric acid

and 1000 volumes of alcohol (50 per cent.) to render it evenly damp and set aside in a tightly closed container for four hours. Place in a percolator, add a sufficient quantity of the acidified alcohol to saturate the drug and leave a layer of liquid above, and, when the liquid commences to drop from the percolator, close the outlet and macerate for forty-eight hours. Then allow percolation to proceed slowly, using as menstruum a mixture of sulphuric acid and alcohol (50 per cent.) in the same proportions as before and continuing the percolation until 6000 millilitres of percolate has been collected. Add to the percolate a slight excess of calcium carbonate, stir well and allow to stand with occasional stirring until effervescence ceases. Filter and evaporate the filtrate as rapidly as possible under reduced pressure at a temperature not exceeding 40° to a soft extract. Determine the proportion of alkaloid in the product and add sufficient liquid glucose to produce an extract of the required strength.

It should be **stored** in well-closed containers in a cool place.

Standard.—Extract of ergot, determined by the method of the British Pharmacopœia for Extractum Ergotæ Liquidum, using about 1 gramme, accurately weighed, dissolved in 10 millilitres of alcohol (50 per cent.), contains when freshly prepared 0·5 per cent. of total alkaloids calculated as ergotoxine.

Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

In making this preparation the alcohol (50 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM EUONYMI

(Ext. Euonym.)

Extract of Euonymus

Synonyms—Euonymin; Brown Euonymin.

	Metric	*Imperial*
Euonymus, in coarse powder ..	1000 g.	16 oz.
Calcium Phosphate	a sufficient quantity	
Alcohol (45 per cent.)	a sufficient quantity	

Exhaust the euonymus with the alcohol by percolation, evaporate the percolate and thoroughly dry the residue. Powder the product as far as possible and mix it with one-fourth of its weight of calcium phosphate, continuing the drying and powdering until a sufficiently dry preparation is obtained.

It should be **stored** in well-closed containers.

Dose.– 0·06 to 0·12 gramme (1 to 2 grains).

In making this preparation the alcohol (45 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM EUPHORBIÆ LIQUIDUM

(Ext. Euphorb. Liq.)

Liquid Extract of Euphorbia

Synonym—Extractum Euphorbiæ Piluliferæ Liquidum.

	Metric	*Imperial*
Euphorbia, in moderately coarse powder	1000 g.	20 oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the euphorbia with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 0·12 to 0·3 millilitre (2 to 5 minims).

EXTRACTUM FUCI

(Ext. Fuci)

Extract of Bladderwrack

	Metric	*Imperial*
Bladderwrack, dried, in moderately coarse powder	1000 g.	16 oz.
Alcohol (45 per cent.)	a sufficient quantity	

Exhaust the bladderwrack with the alcohol by percolation and evaporate the percolate to a soft extract.

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

In making this preparation the alcohol (45 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM FUCI LIQUIDUM

(Ext. Fuci Liq.)

Liquid Extract of Bladderwrack

	Metric	*Imperial*
Bladderwrack, dried, in moderately coarse powder	1000 g.	20 oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the bladderwrack with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

EXTRACTUM GELSEMII

(Ext. Gelsem.)

Extract of Gelsemium

	Metric	*Imperial*
Gelsemium, in moderately fine powder	1000 g.	16 oz.
Alcohol (90 per cent.)	a sufficient quantity	
Distilled Water	a sufficient quantity	

Mix the gelsemium with 2500 millilitres (40 fluid ounces) of the alcohol and macerate in a closed vessel for forty-eight hours; then transfer to a percolator and, when the liquid ceases to pass, continue the percolation with distilled water until 2500 millilitres (40 fluid ounces) of percolate has been collected. Evaporate the percolate to a soft extract.

Dose.– 0·03 to 0·12 gramme (½ to 2 grains).

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM GOSSYPII CORTICIS LIQUIDUM

(Ext. Gossyp. Cort. Liq.)

Liquid Extract of Cotton Root Bark

	Metric	*Imperial*
Cotton Root Bark, in moderately coarse powder	1000 g.	20 oz.
Glycerin	250 ml.	5 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix the glycerin with 750 millilitres (15 fluid ounces) of the alcohol; moisten the cotton root bark with a sufficient quantity of this mixture, and percolate, using as menstruum first the remainder of the mixture of glycerin and alcohol, and afterwards sufficient of the alcohol to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

EXTRACTUM GRINDELIÆ LIQUIDUM

(Ext. Grindel. Liq.)

Liquid Extract of Grindelia

	Metric	*Imperial*
Grindelia, in moderately fine powder	1000 g.	20 oz.
Sodium Bicarbonate	100 g.	2 oz.
Distilled Water	500 ml.	10 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the grindelia with the alcohol by percolation. Recover the alcohol from the percolate by distillation and dissolve the residue in the distilled water to which the sodium bicarbonate has previously been added; after effervescence has ceased, add sufficient distilled water to produce 750 millilitres (15 fluid ounces), and then sufficient of the alcohol to produce the required volume.

Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

In making this preparation the alcohol (90 per cent.) used for the percolation may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM HÆMATOXYLI LIQUIDUM

(Ext. Hæmatox. Liq.)

Liquid Extract of Logwood

Synonym—Liquid Extract of Hæmatoxylon.

	Metric	*Imperial*
Logwood, in moderately coarse powder	1000 g.	20 oz.
Alcohol (90 per cent.)	150 ml.	3 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Boil the logwood with 2000 millilitres (40 fluid ounces) of the water for thirty minutes and strain. Repeat the process twice, mix the strained liquids and evaporate to 850 millilitres (17 fluid ounces). Add the alcohol, set aside for seven days, decant the clear liquid and add sufficient distilled water to produce the required volume.

Dose.– 2 to 8 millilitres ($\frac{1}{2}$ to 2 fluid drachms).

EXTRACTUM HAMAMELIDIS

(Ext. Hamam.)

Extract of Hamamelis

Synonyms—Hamamelin; Hamamelidin.

	Metric	*Imperial*
Hamamelis, in moderately fine powder	1000 g.	16 oz.
Alcohol (90 per cent.)	a sufficient quantity	

Exhaust the hamamelis with the alcohol by percolation, evaporate the percolate to dryness at a low temperature and reduce it to fine powder. It should be **stored** in well-closed containers.

Dose.—0·06 to 0·3 gramme (1 to 5 grains).

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM HYDRASTIS
(Ext. Hydrast.)

Extract of Hydrastis

Synonyms—Hydrastin; Extractum Hydrastis Siccum.

	Metric	*Imperial*
Hydrastis, in moderately fine powder	1000 g.	16 oz.
Alcohol (70 per cent.)	a sufficient quantity	

Exhaust the hydrastis with the alcohol by percolation and evaporate the percolate to dryness. Determine the proportion of hydrastine in the residue and mix the remainder of the product with sufficient calcium phosphate to produce an extract of the required strength.

It should be **stored** in well-closed containers.

Standard.—Extract of hydrastis contains not less than 7·5 per cent. and not more than 8·5 per cent. of hydrastine.

Assay.—Mix 2 grammes with 10 millilitres of alcohol (70 per cent.) and proceed as described under Extractum Hydrastis Liquidum. The weight obtained is that of the hydrastine in 1 gramme of the extract examined.

Dose.– 0·03 to 0·12 gramme ($\frac{1}{2}$ to 2 grains).

In making this preparation the alcohol (70 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM HYDRASTIS LIQUIDUM
(Ext. Hydrast. Liq.)

Liquid Extract of Hydrastis

Synonym—Extractum Hydrastidis fluidum, I.A.

	Metric	*Imperial*
Hydrastis, in moderately fine powder	1000 g.	20 oz.
Alcohol (60 per cent.)	a sufficient quantity	

Exhaust the hydrastis with the alcohol by percolation, reserving the first 800 millilitres (16 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and determine the proportion of hydrastine in the liquid extract thus obtained. To the remainder of the liquid extract add sufficient of the alcohol to produce a liquid extract of the required strength.

Standard.—Liquid extract of hydrastis contains not less than 1·9 per cent. and not more than 2·1 per cent. w/v of hydrastine.

Assay.—Transfer 10 millilitres to a 100 millilitre graduated flask, add 20 millilitres of potassium iodide solution diluted with 60 millilitres of water, and sufficient water to produce 100 millilitres. Shake the mixture for several minutes and filter. Transfer 50 millilitres of the filtrate to a separator, render alkaline with solution of ammonia, add 30 millilitres of ether and shake at intervals during several minutes. Allow the liquid to separate, draw off the aqueous layer and repeat the operation with two successive portions each of 20 millilitres of ether for one minute. Evaporate the mixed ethereal solutions at a gentle heat in a tared beaker, dry the residue on a water-bath and weigh. The weight obtained is that of the hydrastine in 5 millilitres of the liquid examined.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

EXTRACTUM IRIDIS
(Ext. Irid.)
Extract of Iris

Synonyms—Iridin; Extractum Iridis Siccum.

	Metric	*Imperial*
Iris, in moderately fine powder ..	1000 g.	16 oz.
Calcium Phosphate	a sufficient quantity	
Alcohol (70 per cent.)	a sufficient quantity	

Exhaust the iris with the alcohol by percolation, and evaporate the percolate to dryness. Reduce the residue to fine powder, add one-twentieth of its weight of calcium phosphate, again dry and powder. It should be **stored** in well-stoppered bottles.

Dose.– 0·06 to 0·2 gramme (1 to 3 grains).

In making this preparation the alcohol (70 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM JABORANDI LIQUIDUM
(Ext. Jaborand. Liq.)
Liquid Extract of Jaborandi

	Metric	*Imperial*
Jaborandi, in moderately coarse powder	1000 g.	20 oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the jaborandi with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate and continuing until a further 2250 millilitres (45 fluid ounces) has been collected. Evaporate the latter to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

EXTRACTUM KAVÆ LIQUIDUM

(Ext. Kavæ Liq.)

Liquid Extract of Kava

	Metric	*Imperial*
Kava, in moderately coarse powder	1000 g.	20 oz.
Alcohol (45 per cent.)	a sufficient quantity	
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix the kava with 2000 millilitres (40 fluid ounces) of the alcohol (90 per cent.), set aside in a closed vessel for forty-eight hours, transfer to a percolator and percolate slowly, reserving the first 750 millilitres (15 fluid ounces) of percolate. Continue the percolation, adding the alcohol (45 per cent.), until the powder is exhausted; evaporate this percolate at a temperature below 80° to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol (90 per cent.) to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

EXTRACTUM KINO EUCALYPTI LIQUIDUM

(Ext. Kino Eucalypt. Liq.)

Liquid Extract of Eucalyptus Kino

Synonyms—Extractum Gummi Rubri Liquidum; Liquid Extract of Red Gum.

	Metric	*Imperial*
Eucalyptus Kino	250 g.	5 oz.
Alcohol (90 per cent.)	100 ml.	2 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the eucalyptus kino in 650 millilitres (13 fluid ounces) of the distilled water, strain, add the alcohol and sufficient distilled water to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

EXTRACTUM KOLÆ LIQUIDUM

(Ext. Kolæ Liq.)

Liquid Extract of Kola

	Metric	*Imperial*
Kola, in moderately fine powder	1000 g.	20 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the kola with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

EXTRACTUM LACTUCÆ

(Ext. Lactuc.)

Extract of Lettuce

	Metric	*Imperial*
Lettuce	1000 g.	16 oz.

Bruise the lettuce in a stone mortar, press out the juice, heat it gradually to 55° and separate the green colouring matter by a calico filter. Heat the strained liquid to 95° and again filter. Evaporate the filtrate on a water-bath to the consistence of a thin syrup; add to it the green colouring matter previously separated and passed through a hair sieve and, mixing thoroughly, continue the evaporation at a temperature not exceeding 60° to a soft extract.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

EXTRACTUM LEPTANDRÆ

(Ext. Leptand.)

Extract of Leptandra

Synonym—Leptandrin.

	Metric	*Imperial*
Leptandra, in moderately coarse powder	1000 g.	16 oz.
Calcium Phosphate	a sufficient quantity	
Alcohol (90 per cent.)	a sufficient quantity	

Exhaust the leptandra with the alcohol by percolation, evaporate the percolate to dryness at a low temperature, reduce it to fine powder and mix with one-twentieth of its weight of calcium phosphate.

Dose.– 0·03 to 0·12 gramme ($\frac{1}{2}$ to 2 grains).

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM LUPULI

(Ext. Lupul.)

Extract of Lupulus

Synonym—Extract of Hops.

	Metric	*Imperial*
Lupulus	1000 g.	16 oz.
Alcohol (90 per cent.)	1875 ml.	30 fl. oz.
Distilled Water	10000 ml.	160 fl. oz.

Macerate the lupulus in the alcohol for seven days; press, filter and

evaporate to a soft extract; boil the residual lupulus with the water for one hour, press, strain and evaporate to a soft extract; mix the two extracts.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM MALTI CUM OLEO OLIVÆ

(Ext. Malt. c. Ol. Oliv.)

Extract of Malt with Olive Oil

	Metric	*Imperial*
Olive Oil	100 g.	1 oz. 262½ gr.
Extract of Malt	..to 1000 g.	to 16 oz.

Mix.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

EXTRACTUM MALTI CUM VITAMINIS

(Ext. Malt. c. Vitam.)

Extract of Malt with Vitamins

Extract of malt with vitamins contains in each fluid drachm approximately 3000 units of vitamin A and approximately 225 units of vitamin D. It may be prepared with standardised cod-liver oil concentrate suitably adjusted, if necessary, or by the following process:—

	Metric	*Imperial*
Solution of Vitamin A	10 g.	70 gr.
Solution of Irradiated Ergosterol	15 g.	105 gr.
Arachis Oil	30 g.	210 gr.
Vanillin	1 g.	7 gr.
Extract of Malt ..	.to 1000 g.	to 16 oz.

Mix the solutions of vitamin A and irradiated ergosterol and the vanillin with the arachis oil, and rapidly incorporate with the extract of malt in a warm mortar.

It should be **stored** in completely-filled, well-closed containers in a cool place and protected from light.

Dose.– 8 to 30 millilitres (½ to 1 fluid ounce).

EXTRACTUM MALTI FERRATUM

(Ext. Malt. Ferrat.)

Ferrated Extract of Malt

	Metric	*Imperial*
Soluble Iron Pyrophosphate ..	15 g.	105 gr.
Distilled Water	25 ml.	192 m.
Extract of Malt	to 1000 g.	to 16 oz.

Dissolve the iron pyrophosphate in the distilled water and mix with the extract of malt in a warm vessel.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EXTRACTUM MALTI LIQUIDUM

(Ext. Malt. Liq.)

Liquid Extract of Malt

Liquid extract of malt is prepared from malted barley by digestion with water and by evaporation of the strained liquid until the product, after the addition of the necessary proportion of alcohol, has a specific gravity of about 1·23, or by the following process.

	Metric	*Imperial*
Extract of Malt	675 ml.	13½ fl. oz.
Alcohol (90 per cent.)	100 ml.	2 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the alcohol with 250 millilitres (5 fluid ounces) of the water, dilute the extract of malt with the mixture and add sufficient distilled water to produce 1000 millilitres (20 fluid ounces). Allow to stand until clear, or clarify by filtration if necessary.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EXTRACTUM MALTI LIQUIDUM CUM GLYCEROPHOSPHATIBUS

(Ext. Malt. Liq. c. Glycerophosph.)

Liquid Extract of Malt with Glycerophosphates

	Metric	*Imperial*
Solution of Potassium Glycerophosphate	18·3 g.	160 gr.
Solution of Sodium Glycerophosphate	18·3 g.	160 gr.
Liquid Extract of Malt	to 1000·0 ml.	to 20 fl. oz.

Mix.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EXTRACTUM MALTI LIQUIDUM CUM HÆMOGLOBINO

(Ext. Malt. Liq. c. Hæmoglob.)

Liquid Extract of Malt with Hæmoglobin

Synonym—Malt and Hæmoglobin.

	Metric	*Imperial*
Hæmoglobin	125 g.	2½ oz.
Glycerin	100 ml.	2 fl. oz.
Liquid Extract of Malt	to 1000 ml.	to 20 fl. oz.

Triturate the hæmoglobin with the glycerin and about 750 millilitres (15 fluid ounces) of the liquid extract of malt and allow the mixture to stand, with occasional stirring, until the hæmoglobin is dissolved. Add sufficient liquid extract of malt to produce the required volume and strain through muslin if necessary.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EXTRACTUM MALTI LIQUIDUM CUM HYPOPHOSPHITIBUS

(Ext. Malt. Liq. c. Hypophosph.)

Liquid Extract of Malt with Hypophosphites

	Metric	*Imperial*
Calcium Hypophosphite ..	5 g.	43¾ gr.
Sodium Hypophosphite ..	5 g.	43¾ gr.
Distilled Water	50 ml.	1 fl. oz.
Liquid Extract of Malt	to 1000 ml.	to 20 fl. oz.

Dissolve the hypophosphites in the distilled water and mix with the liquid extract of malt.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EXTRACTUM MALTI LIQUIDUM CUM QUININA ET STRYCHNINA

(Ext. Malt. Liq. c. Quinin. et. Strych.)

Liquid Extract of Malt with Quinine and Strychnine

	Metric	*Imperial*
Quinine Hydrochloride ..	2·3 g.	20 gr.
Solution of Strychnine Hydrochloride	10·0 ml.	96 m.
Distilled Water	50·0 ml.	1 fl. oz.
Liquid Extract of Malt ..	to 1000·0 ml.	to 20 fl. oz.

Dissolve the quinine hydrochloride in the distilled water with the aid of gentle heat, add the solution of strychnine hydrochloride and sufficient liquid extract of malt to produce the required volume.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EXTRACTUM MALTI LIQUIDUM ET MEDULLÆ RUBRÆ
(Ext. Malt. Liq. et Medull. Rub.)
Liquid Extract of Malt and Red Bone Marrow

	Metric	*Imperial*
Extract of Red Bone Marrow ..	500 ml.	10 fl. oz.
Liquid Extract of Malt	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

EXTRACTUM MEDULLÆ RUBRÆ
(Ext. Medull. Rub.)
Extract of Red Bone Marrow

Synonym—Glycerin Extract of Red Bone Marrow.

	Metric	*Imperial*
Red Bone Marrow	250 g.	5 oz.
Chloroform Water	a sufficient quantity	
Glycerin	a sufficient quantity	

Mix the red bone marrow with 500 millilitres (10 fluid ounces) of glycerin by vigorous trituration, add 500 millilitres (10 fluid ounces) of chloroform water and beat the whole together frequently during one hour; strain and add sufficient of a mixture of equal volumes of chloroform water and glycerin to produce 1000 millilitres (20 fluid ounces).

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

EXTRACTUM OPII LIQUIDUM
(Ext. Opii Liq.)
Liquid Extract of Opium

	Metric	*Imperial*
Dry Extract of Opium	37·5 g.	¾ oz.
Alcohol (90 per cent.)	200·0 ml.	4 fl. oz.
Distilled Water	.. to 1000 0 ml.	to 20 fl. oz.

Mix the extract with 700 millilitres (14 fluid ounces) of distilled water and set aside in a cool place for twenty-four hours, stirring frequently; add the alcohol and again set aside for twenty-four hours; filter and wash the filter with sufficient distilled water to produce the required volume.

Standard.—Liquid extract of opium, determined by the method of the British Pharmacopœia for Tinctura Opii, contains not less

than 0·7 per cent. and not more than 0·8 per cent. w/v of morphine, calculated as anhydrous.

Dose.– 0·3 to 2 millilitres (5 to 30 minims).

EXTRACTUM PAPAVERIS LIQUIDUM
(Ext. Papav. Liq.)

Liquid Extract of Poppy

Synonym—Liquor pro Syrupo Papaveris.

	Metric	*Imperial*
Poppy Capsule, in moderately coarse powder	1000 g.	20 oz.
Alcohol (90 per cent.)	a sufficient quantity	
Alcohol (25 per cent.)	a sufficient quantity	
Distilled Water	a sufficient quantity	

Exhaust the poppy capsule by percolation with boiling distilled water and evaporate the percolate to about 700 millilitres (14 fluid ounces). Filter, and determine the proportion of morphine in the filtrate. Add to the remainder of the filtrate one-third its volume of alcohol (90 per cent.) and sufficient alcohol (25 per cent.) to produce a liquid extract of poppy of the required strength. Allow to stand for not less than seven days, and filter.

Standard.—Liquid extract of poppy, determined by the method of the British Pharmacopœia for Tinctura Opii Camphorata, using 2·5 millilitres, contains not less than 0·16 per cent. and not more than 0·18 per cent. w/v of morphine, calculated as anhydrous.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

EXTRACTUM PINI ALBI LIQUIDUM
(Ext. Pini Alb. Liq.)

Liquid Extract of White Pine

	Metric	*Imperial*
White Pine, in moderately fine powder	1000 g.	20 oz.
Alcohol (25 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the white pine with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate; evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

EXTRACTUM PINI CANADENSIS LIQUIDUM

(Ext. Pini Canad. Liq.)

Liquid Extract of Hemlock Spruce

	Metric	*Imperial*
Hemlock Spruce, in moderately fine powder	1000 g.	20 oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the hemlock spruce with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

EXTRACTUM PISCIDIÆ LIQUIDUM

(Ext. Piscid. Liq.)

Liquid Extract of Piscidia

	Metric	*Imperial*
Piscidia, in moderately coarse powder	1000 g.	20 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the piscidia with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

EXTRACTUM PULSATILLÆ LIQUIDUM

(Ext. Pulsat. Liq.)

Liquid Extract of Pulsatilla

	Metric	*Imperial*
Pulsatilla, in moderately fine powder	1000 g.	20 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the pulsatilla with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose. - 0·12 to 0·3 millilitre (2 to 5 minims).

EXTRACTUM QUASSIÆ
(Ext. Quass.)
Extract of Quassia

	Metric	*Imperial*
Quassia, rasped	100 g.	16 oz.
Distilled Water	a sufficient quantity	

Macerate the quassia with 500 millilitres (8 fluid ounces) of distilled water for twelve hours, transfer to a percolator and exhaust the drug by percolation with distilled water. Evaporate the percolate, filter before it becomes too thick, and evaporate to a soft extract.

Dose.– 0·18 to 0·3 gramme (3 to 5 grains).

EXTRACTUM QUILLAIÆ LIQUIDUM
(Ext. Quill. Liq.)
Liquid Extract of Quillaia

	Metric	*Imperial*
Quillaia, in moderately fine powder	1000 g.	20 oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the quillaia with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

EXTRACTUM RHEI
(Ext. Rhei)
Extract of Rhubarb

	Metric	*Imperial*
Rhubarb, in moderately coarse powder	1000 g.	16 oz.
Alcohol (60 per cent.)	a sufficient quantity	

Exhaust the rhubarb with the alcohol by percolation and evaporate the percolate to dryness.

It should be **stored** in well-closed containers.

Dose.– 0·12 to 0·5 gramme (2 to 8 grains).

In making this preparation the alcohol (60 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM RHEI LIQUIDUM
(Ext. Rhei Liq.)
Liquid Extract of Rhubarb

	Metric	*Imperial*
Rhubarb, in moderately coarse powder	1000 g.	20 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the rhubarb with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

EXTRACTUM SABAL LIQUIDUM
(Ext. Sabal Liq.)
Liquid Extract of Sabal

Synonym—Liquid Extract of Saw Palmetto.

	Metric	*Imperial*
Sabal, in moderately fine powder	1000 g.	20 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the sabal with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 0·6 to 1·5 millilitres (10 to 25 minims).

EXTRACTUM SALICIS NIGRÆ LIQUIDUM
(Ext. Salic. Nig. Liq.)
Liquid Extract of Black Willow

	Metric	*Imperial*
Black Willow, in moderately coarse powder	1000 g.	20 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the black willow with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

EXTRACTUM SCILLÆ LIQUIDUM

(Ext. Scill. Liq.)

Liquid Extract of Squill

	Metric	*Imperial*
Squill, in coarse powder ..	1000 g.	20 oz.
Alcohol (70 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the squill with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion, add sufficient of the alcohol to produce the required volume and filter.

Dose.– 0·06 to 0·2 millilitre (1 to 3 minims).

EXTRACTUM STRAMONII

(Ext. Stramon.)

Extract of Stramonium

	Metric	*Imperial*
Stramonium, in moderately coarse powder	1000 g.	16 oz.
Alcohol (70 per cent.)	a sufficient quantity	
Liquid Glucose	a sufficient quantity	

Exhaust the stramonium with the alcohol by percolation and evaporate the percolate at a temperature not exceeding 80° to a soft extract. Determine the proportion of alkaloid in the product and, if necessary, evaporate further or add sufficient liquid glucose to produce an extract of the required strength.

Standard.—Extract of stramonium, determined by the method of the British Pharmacopœia for Extractum Belladonnæ Siccum, contains not less than 0·95 per cent. and not more than 1·05 per cent. of the alkaloids of stramonium calculated as hyoscyamine.

Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain.)

In making this preparation the alcohol (70 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM STRAMONII LIQUIDUM

(Ext. Stramon. Liq.)

Liquid Extract of Stramonium

	Metric	*Imperial*
Stramonium, in moderately coarse powder	1000 g.	20 oz.
Alcohol (70 per cent.)	a sufficient quantity	

Exhaust the stramonium with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract and dissolve it in the reserved portion. Determine the proportion of alkaloid in the liquid and, if necessary, add more of the alcohol or continue evaporation to produce a liquid extract of the required strength.

Standard.—Liquid extract of stramonium, determined by the method of the British Pharmacopœia for Extractum Belladonnæ Liquidum, contains not less than 0·225 per cent. and not more than 0·275 per cent. w/v of the alkaloids of stramonium calculated as hyoscyamine.

Dose.– 0·03 to 0·2 millilitre (½ to 3 minims).

EXTRACTUM STROPHANTHI

(Ext. Strophanth.)

Extract of Strophanthus

	Metric	*Imperial*
Strophanthus, in moderately coarse powder	500 g.	8 oz.
Ether	a sufficient quantity	
Alcohol (90 per cent.)	a sufficient quantity	
Lactose	to 1000 g.	to 16 oz.

Pack the strophanthus in a percolator, moisten with ether and macerate for twenty-four hours; then allow percolation to proceed, continuing the addition of ether until the liquid which passes through is colourless. Remove the marc from the percolator and dry it, gradually heating it to 50°. Again reduce it to powder, repack in a percolator, moisten with the alcohol and macerate for forty-eight hours. Then percolate slowly with more of the alcohol until 5000 millilitres (80 fluid ounces) of liquid is obtained. Evaporate most of the alcohol, transfer the residual liquid to a tared dish, concentrate until the liquid begins to thicken and add sufficient lactose to produce the required weight of powdered extract.

Dose.– 0·016 to 0·06 gramme (¼ to 1 grain).

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

This extract is unstandardised and represents half its weight of strophanthus. If desired it may be standardised by a biological method similar to the biological assay of tincture of strophanthus.

EXTRACTUM TARAXACI
(Ext. Tarax.)
Extract of Taraxacum

	Metric	*Imperial*
Taraxacum, fresh	1000 g.	16 oz.

Crush the taraxacum, press out the juice and allow the feculence to subside; decant, heat the liquid to 100° and maintain at that temperature for ten minutes, strain and evaporate to a soft extract.

Dose.– 0 3 to 1 gramme (5 to 15 grains).

EXTRACTUM TARAXACI LIQUIDUM
(Ext. Tarax. Liq.)
Liquid Extract of Taraxacum

	Metric	*Imperial*
Taraxacum, dried, in moderately coarse powder	1000 g.	20 oz.
Alcohol (60 per cent.)	2000 ml.	40 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the taraxacum with the alcohol, set aside in a closed vessel for forty-eight hours, then press out and reserve 500 millilitres (10 fluid ounces) of liquid. Mix the pressed residue with 2000 millilitres (40 fluid ounces) of distilled water, set aside for forty-eight hours, press out the liquid, strain, evaporate to about 500 millilitres (10 fluid ounces), mix it with the reserved portion, add, if necessary, sufficient distilled water to produce the required volume, and filter.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

EXTRACTUM THYMI LIQUIDUM
(Ext. Thym. Liq.)
Liquid Extract of Thyme

Synonym—Extractum Thymi Vulgaris Liquidum.

	Metric	*Imperial*
Thyme, in moderately coarse powder	1000 g.	20 oz.
Glycerin	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	a sufficient quantity	
Distilled Water	a sufficient quantity	

Exhaust the thyme by percolation, using as menstruum first a mixture of the glycerin with 250 millilitres (5 fluid ounces) of alcohol (90 per cent.) and 650 millilitres (13 fluid ounces) of distilled water, and then a mixture of one volume of alcohol (90 per cent.) with three volumes of distilled water. Reserve the first 850 millilitres (17 fluid ounces) of percolate, evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add, if necessary, sufficient of the second menstruum to produce 1000 millilitres (20 fluid ounces).

Dose.– 0·6 to 4 millilitres (10 to 60 minims).

EXTRACTUM THYROIDEI LIQUIDUM

(Ext. Thyroid. Liq.)

Liquid Extract of Thyroid

	Metric	*Imperial*
Thyroid	220 g.	4 oz. 175 gr.
Dilute Hydrochloric Acid ..	25 ml.	½ fl. oz.
Double Chloroform Water ..	200 ml.	4 fl. oz.
Glycerin	to 1000 ml.	to 20 fl. oz.

Triturate the thyroid with 400 millilitres (8 fluid ounces) of glycerin, add the dilute hydrochloric acid and double chloroform water and set aside for twenty-four hours; strain through linen, pressing strongly, and add sufficient glycerin to produce the required volume.

Dose.– 0·06 to 1·2 millilitres (1 to 20 minims).

EXTRACTUM TUSSILAGINIS LIQUIDUM

(Ext. Tussilag. Liq.)

Liquid Extract of Coltsfoot

	Metric	*Imperial*
Coltsfoot Flower, in moderately coarse powder	1000 g.	20 oz.
Alcohol (90 per cent.)	250 ml.	5 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Exhaust the coltsfoot flower with the distilled water by percolation. Evaporate the percolate to 750 millilitres (15 fluid ounces), add the alcohol and allow to stand for fourteen days; filter and pass, if necessary, sufficient distilled water through the filter to produce the required volume.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

EXTRACTUM VALERIANÆ

(Ext. Valerian.)

Extract of Valerian

	Metric	*Imperial*
Valerian, in moderately fine powder	1000 g.	16 oz.
Alcohol (70 per cent.)	a sufficient quantity	

Exhaust the drug with the alcohol by percolation and evaporate the percolate to a firm extract.

It should be **stored** in well-closed containers.

Dose.– 0·06 to 0·3 gramme (1 to 5 grains).

In making this preparation the alcohol (70 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM VALERIANÆ LIQUIDUM

(Ext. Valerian. Liq.)

Liquid Extract of Valerian

	Metric	*Imperial*
Valerian, freshly dried, in moderately coarse powder ..	1000 g.	20 oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the valerian with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate, evaporate the subsequent percolate to a thin syrup, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume. Allow to stand for not less than fourteen days and filter.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

EXTRACTUM VIBURNI

(Ext. Viburn.)

Extract of Black Haw

	Metric	*Imperial*
Black Haw, in moderately fine powder	1000 g.	16 oz.
Alcohol (70 per cent.) . .	a sufficient quantity	

Exhaust the black haw with the alcohol by percolation and evaporate the percolate to a soft extract.

Dose.– 0·2 to 0·5 gramme (3 to 8 grains).

In making this preparation the alcohol (70 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

EXTRACTUM VIBURNI LIQUIDUM
(Ext. Viburn. Liq.)

Liquid Extract of Black Haw

	Metric	*Imperial*
Black Haw, in moderately fine powder	1000 g.	20 oz.
Alcohol (70 per cent.)	to 1000 ml.	to 20 fl. oz.

Exhaust the black haw with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

GARGARISMATA
Gargles

A gargle is an aqueous solution for use as a prophylactic or in the treatment of an affection of the throat. The particular method of using a gargle is intended to bring it into intimate contact with the membranous lining of the throat. It is not intended to act as a protective covering to the membrane, and therefore oily substances requiring suspending agents, and drugs of a mucilaginous nature, should not be used.

In the case of the following gargles, when no strength is indicated by the prescriber, aqueous solutions of the following strengths should be supplied.

Gargarisma Boracis.—Borax, 3·4 per cent. w/v.

Gargarisma Chromii Trioxidi.—Chromium trioxide, 0·2 per cent. w/v.

Gargarisma Formaldehydi.—Solution of formaldehyde, 0·2 per cent. v/v.

Gargarisma Kino Eucalypti.—Liquid extract of eucalyptus kino, 6·25 per cent. v/v.

Gargarisma Potassii Permanganatis.—Potassium permanganate, 0 025 per cent. w/v.

Gargarisma Sodii Bicarbonatis.—Sodium bicarbonate, 5 per cent. w/v.

GARGARISMA ACIDI TANNICI
(Garg. Acid. Tann.)

Tannic Acid Gargle

	Metric	*Imperial*
Glycerin of Tannic Acid	125 ml.	2½ fl. oz.
Distilled Water	to 1000 ml.	20 fl. oz.

Mix.

GARGARISMA ALUMINIS

(Garg. Alum.)

Alum Gargle

	Metric	*Imperial*
Glycerin of Alum	125 ml.	2½ fl. oz
Acid Infusion of Roses	to 1000 ml.	to 20 fl. oz.

Mix.

GARGARISMA CHLORI

(Garg. Chlor.)

Chlorine Gargle

	Metric	*Imperial*
Potassium Chlorate	22·9 g.	200 gr.
Hydrochloric Acid	4·2 ml.	40 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Place the powdered potassium chlorate in a dry bottle, pour the acid upon it and set aside, loosely corked, for ten minutes; then add the distilled water in four or five successive portions, shaking between each addition, so that the gas may be dissolved as completely as possible. It should be recently prepared and not exposed to sunlight, and should be diluted before use with one or more parts of water.

GARGARISMA PHENOLIS

(Garg. Phenol.)

Phenol Gargle

Synonym—Gargarisma Acidi Carbolici.

	Metric	*Imperial*
Glycerin of Phenol	50 ml.	1 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix.

GARGARISMA POTASSII CHLORATIS

(Garg. Pot. Chlorat.)

Potassium Chlorate Gargle

	Metric	*Imperial*
Potassium Chlorate	22·9 g.	200 gr.
Dilute Hydrochloric Acid ..	10·4 ml.	100 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the potassium chlorate in about 900 millilitres (18 fluid ounces) of the distilled water, add the dilute hydrochloric acid and sufficient distilled water to produce the required volume.

GELATINUM CODEINÆ
(Gelat. Codein.)
Codeine Jelly

	Metric	*Imperial*
Codeine	2·0 g.	22 gr.
Citric Acid	20·0 g.	½ oz.
Gelatin	80·0 g.	2 oz.
Glycerin	480·0 ml.	12 fl. oz.
Oil of Lemon	0·4 ml.	5 m.
Solution of Tolu	360·0 ml.	9 fl. oz.

Soak the gelatin in 300 millilitres (7½ fluid ounces) of the solution of tolu, add the glycerin, and heat until dissolved. Dissolve the codeine and citric acid in the remaining 60 millilitres (1½ fluid ounces) of the solution of tolu, add the solution to the solution of gelatin, add the oil of lemon, and mix.

Dose.– 4 grammes (1 drachm).

GELATINUM ZINCI ET ICHTHAMMOLIS
(Gelat. Zinc. et Ichtham.)
Gelatin of Zinc and Ichthammol

Synonyms—Pasta Zinci et Ichthammolis; Unna's Paste with Ichthammol.

	Metric	*Imperial*
Zinc Oxide, finely sifted ..	150 g.	3 oz.
Ichthammol	20 g.	175 gr.
Gelatin	150 g.	3 oz.
Glycerin	350 ml.	7 fl. oz.
Distilled Water	350 ml.	7 fl. oz.

Soften the gelatin by soaking it in the water, then add the glycerin previously mixed with the zinc oxide and the ichthammol to form a smooth paste; heat on a water-bath until the gelatin is dissolved, stir until uniform, and pour into a flat dish or tray to solidify.

GLYCERINUM ACIDI GALLICI
(Glycer. Acid. Gall.)
Glycerin of Gallic Acid

	Metric	*Imperial*
Gallic Acid	150 g.	2 oz. 175 gr.
Glycerin	to 1000 g.	to 16 oz.

Triturate the gallic acid with sufficient glycerin to produce the

required weight and warm the mixture on a water-bath, with frequent stirring, until solution is complete.

Dose.– 0·6 to 4 millilitres (10 to 60 minims)

GLYCERINUM ATROPINÆ
(Glycer. Atrop.)

Glycerin of Atropine

	Metric	*Imperial*
Solution of Atropine Sulphate ..	250·0 ml.	5 fl. oz.
Compound Tincture of Lavender	10·4 ml.	100 m.
Glycerin	to 1000·0 ml.	to 20 fl. oz.

Mix.

GLYCERINUM BELLADONNÆ
(Glycer. Bellad.)

Glycerin of Belladonna

	Metric	*Imperial*
Green Extract of Belladonna ..	500·0 g.	8 oz.
Distilled Water, boiling	62·5 ml.	1 fl. oz.
Glycerin	to 1000·0 g.	to 16 oz.

Triturate the green extract of belladonna with the boiling distilled water to produce a smooth paste, add sufficient glycerin to produce the required weight, and mix.

GLYCERINUM BISMUTHI CARBONATIS
(Glycer. Bism. Carb.)

Glycerin of Bismuth Carbonate

	Metric	*Imperial*
Bismuth Carbonate	500 g.	10 oz.
Glycerin	500 ml.	10 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 0·6 to 4 millilitres (10 to 60 minims).

GLYCERINUM CARMINI

(Glycer. Carmin.)

Glycerin of Carmine

	Metric	*Imperial*
Carmine	62·5 g.	1¼ oz.
Potassium Carbonate	10·0 g.	87½ gr.
Potassium Citrate	100·0 g.	2 oz.
Glycerin	200·0 ml.	4 fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the potassium carbonate in 600 millilitres (12 fluid ounces) of distilled water, and digest the carmine in the solution on a water-bath until the colouring matter is dissolved; then strain, cool, add the glycerin and potassium citrate, and sufficient distilled water to produce the required volume.

GLYCERINUM CROCI

(Glycer. Croc.)

Glycerin of Saffron

	Metric	*Imperial*
Saffron	25 g.	½ oz.
Alcohol (60 per cent.)	500 ml.	10 fl. oz.
Glycerin	500 ml.	10 fl. oz.

Mix the glycerin with the alcohol, digest the saffron in the mixture for one hour at a gentle heat, and filter. It should be **stored** in completely-filled, well-closed bottles, and protected from light.

GLYCERINUM DIAMORPHINÆ

(Glycer. Diamorph.)

Glycerin of Diamorphine

	Metric	*Imperial*
Diamorphine Hydrochloride	0·5 g.	4½ gr.
Distilled Water	100·0 ml.	2 fl. oz.
Concentrated Acid Infusion of Roses	62·5 ml.	1¼ fl. oz.
Syrup	450·0 ml.	9 fl. oz.
Chloroform	2·0 ml.	19 m.
Alcohol (90 per cent.)	4·0 ml.	38 m.
Glycerin	to 1000·0 ml.	to 20 fl. oz.

Dissolve the diamorphine hydrochloride in the distilled water and gradually add the syrup and concentrated acid infusion of roses, shaking after each addition; then add the chloroform previously dissolved in the alcohol, and sufficient glycerin to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

GLYCERINUM FERRI PERCHLORIDI

(Glycer. Ferr. Perchlor.)

Glycerin of Ferric Chloride

	Metric	*Imperial*
Solution of Ferric Chloride ..	500 ml.	10 fl. oz.
Glycerin	500 ml.	10 fl. oz.

Mix.

GLYCERINUM GLYCEROPHOSPHATUM COMPOSITUM

(Glycer. Glycerophosph. Co.)

Compound Glycerin of Glycerophosphates

Synonyms—Elixir Glycerophosphatum; Elixir of Glycerophosphates; Glycerol Glycerophosphatis.

	Metric	*Imperial*
Calcium Glycerophosphate ..	22·9 g.	200 gr.
Magnesium Glycerophosphate ..	11·4 g.	100 gr.
Iron Glycerophosphate	5·7 g.	50 gr.
Solution of Potassium Glycerophosphate	22·9 g.	200 gr.
Solution of Sodium Glycerophosphate	22·9 g.	200 gr.
Potassium Citrate	11·4 g.	100 gr.
Glycerophosphoric Acid ..	20·8 ml.	200 m.
Triple Orange-flower Water ..	12·5 ml.	120 m.
Cherry-laurel Water	20·8 ml.	200 m.
Solution of Bordeaux B ..	31·2 ml.	300 m.
Glycerin	500·0 ml.	10 fl. oz.
Double Chloroform Water	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the potassium citrate in 350 millilitres (7 fluid ounces) of double chloroform water, add the solution of potassium glycerophosphate and solution of sodium glycerophosphate and dissolve the calcium, magnesium and iron glycerophosphates in the mixture. Add the glycerophosphoric acid, triple orange-flower water, cherry-laurel water, solution of bordeaux B, glycerin, and sufficient double chloroform water to produce the required volume.

Dose.—4 to 8 millilitres (1 to 2 fluid drachms).

GLYCERINUM GLYCEROPHOSPHATUM CUM MEDULLA RUBRA

(Glyc. Glycerophosph. c. Medull. Rub.)

Glycerin of Glycerophosphates with Red Bone Marrow

Synonyms—Elixir Glycerophosphatum cum Medulla Rubra; Elixir of Glycerophosphates with Red Bone Marrow; Glycerol Glycerophosphatis cum Medulla Rubra.

	Metric	*Imperial*
Extract of Red Bone Marrow ..	500 ml.	10 fl. oz.
Compound Glycerin of Glycerophosphates	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

GLYCERINUM HYPOPHOSPHITUM COMPOSITUM

(Glycer. Hypophosph. Co.)

Compound Glycerin of Hypophosphites

Synonym—Glycerol Hypophosphitis.

	Metric	*Imperial*
Calcium Hypophosphite ..	17·2 g.	150 gr.
Manganese Hypophosphite ..	8·6 g.	75 gr.
Potassium Hypophosphite ..	17·2 g.	150 gr.
Quinine	8·3 g.	73 gr.
Strychnine	0·23 g.	2 gr.
Solution of Iron Hypophosphite	200·0 ml.	4 fl. oz.
Hypophosphorous Acid	12·5 ml.	120 m.
Distilled Water	150·0 ml.	3 fl. oz.
Glycerin	to 1000·0 ml.	to 20 fl. oz.

Dissolve the hypophosphites in the distilled water, and the quinine and strychnine in a mixture of the solution of iron hypophosphite and the hypophosphorous acid, mix the solutions and add sufficient glycerin to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

GLYCERINUM ICHTHAMMOLIS

(Glycer. Ichtham.)

Glycerin of Ichthammol

Synonym—Glycerin of Ammonium Ichthosulphonate.

	Metric	*Imperial*
Ichthammol	100 g.	1 oz.
Glycerin	900 g.	9 oz.

Mix.

GLYCERINUM IODOFORMI

(Glycer. Iodof.)

Glycerin of Iodoform

Synonym—Emulsio Iodoformi.

	Metric	*Imperial*
Iodoform	100 g.	2 oz.
Alcohol (90 per cent.)	a sufficient quantity	
Glycerin	700 g.	14 oz.
Sterilised Water	200 ml.	4 fl. oz.

Triturate the iodoform with sufficient alcohol to make a smooth paste, using a sterilised mortar and pestle. Mix the glycerin and the sterilised water in a wide-mouthed flask, sterilise with the aid of heat, add the mixture to the iodoform, stir well and transfer to a sterile container.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

GLYCERINUM PANCREATINI

(Glycer. Pancreatin.)

Glycerin of Pancreatin

	Metric	*Imperial*
Pancreatin	100 g.	2 oz.
Glycerin	500 ml.	10 fl. oz.
Simple Elixir	50 ml.	1 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Macerate the pancreatin in 300 millilitres (6 fluid ounces) of the distilled water for twenty-four hours, add the glycerin, and macerate for seven days; add the simple elixir and sufficient distilled water to produce the required volume, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

GLYCERINUM PAPAINI

(Glycer. Papain.)

Glycerin of Papain

	Metric	*Imperial*
Papain	90 g.	1 oz. 350 gr.
Dilute Hydrochloric Acid ..	80 ml.	1 fl. oz. 288 m.
Simple Elixir	50 ml.	1 fl. oz.
Glycerin	to 1000 ml.	to 20 fl. oz.

Digest the papain for seven days in a mixture of the dilute hydrochloric acid and 700 millilitres (14 fluid ounces) of glycerin, filter through flannel, add the simple elixir and sufficient glycerin to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

GLYCERINUM PEPSINI
(Glycer. Pepsin.)
Glycerin of Pepsin

	Metric	*Imperial*
Pepsin	100·0 g.	2 oz.
Hydrochloric Acid	11·5 ml.	110 m.
Glycerin	600·0 ml.	12 fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Mix the hydrochloric acid, glycerin and 250 millilitres (5 fluid ounces) of distilled water, and dissolve the pepsin in the mixture; add sufficient distilled water to produce the required volume, set aside for twenty minutes and filter.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

GLYCERINUM PEPSINI FORTIUS
(Glycer. Pepsin. Fort.)
Stronger Glycerin of Pepsin
Synonym—Glycerol of Pepsin.

	Metric	*Imperial*
Pepsin	150 g.	3 oz.
Dilute Hydrochloric Acid	50 ml.	1 fl. oz.
Glycerin	500 ml.	10 fl. oz.
Simple Elixir	50 ml.	1 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Add the pepsin to 300 millilitres (6 fluid ounces) of the distilled water previously mixed with the dilute hydrochloric acid and glycerin; shake well and set aside until clear; decant or filter, add the simple elixir and, if necessary, sufficient distilled water to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

GLYCERINUM PLUMBI SUBACETATIS

(Glycer. Plumb. Subacet.)

Glycerin of Lead Subacetate

	Metric	*Imperial*
Strong Solution of Lead Subacetate	500 ml.	10 fl. oz.
Glycerin	500 ml.	10 fl. oz.
Distilled Water	a sufficient quantity	

Evaporate the strong solution of lead subacetate to dryness on a water-bath, add the glycerin and warm gently until the residue is dissolved; cool, add distilled water until the specific gravity of the mixture is 1·48 and filter if necessary.

GLYCERINUM THYMOLIS COMPOSITUM

(Glycer. Thymol. Co.)

Compound Glycerin of Thymol

Synonym—Glycerinum Thymol Alkalinum.

	Metric	*Imperial*
Sodium Bicarbonate	10·0 g.	87½ gr.
Borax	20 0 g.	175 gr.
Sodium Benzoate	8 0 g.	70 gr.
Sodium Salicylate	5·2 g.	45 gr.
Menthol	0·3 g.	2½ gr.
Thymol	0·5 g.	4½ gr.
Eucalyptol	1·3 ml.	13 m.
Oil of Pumilio Pine	0·5 ml.	5 m.
Oil of Sweet Birch	0·3 ml.	3 m.
Alcohol (90 per cent.)	25·0 ml.	½ fl. oz.
Glycerin	100·0 ml.	2 fl. oz.
Solution of Bordeaux B	10·4 ml.	100 m.
Distilled Water	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the salts in 800 millilitres (16 fluid ounces) of the distilled water and add the glycerin; dissolve the menthol, thymol, eucalyptol and oils in the alcohol, triturate with 25 grammes (½ ounce) of purified talc or kaolin, add the mixture gradually to the solution of salts, filter, add the solution of bordeaux B and sufficient distilled water to produce the required volume.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

GLYCERINUM TRAGACANTHÆ
(Glycer. Trag.)
Glycerin of Tragacanth

	Metric	*Imperial*
Tragacanth, in powder	200 g.	3 oz.
Glycerin	600 ml.	9 fl. oz.
Distilled Water	200 ml.	3 fl. oz.

Mix the glycerin with the tragacanth, add the distilled water, and triturate until a homogeneous paste is produced.

GLYCOGELATINUM
(Glycogelat.)
Glycogelatin

	Metric	*Imperial*
Gelatin	200·0 g.	3 oz. 87½ gr.
Glycerin	400·0 g.	6 oz. 175 gr.
Sucrose	50·0 g.	350 gr.
Citric Acid	20·0 g.	140 gr.
Sodium Benzoate	2·0 g.	14 gr.
Oil of Lemon	1·0 ml.	8 m.
Solution of Bordeaux B	10·4 ml.	80 m.
Triple Orange-flower Water ..	62·5 ml.	1 fl. oz.
Distilled Water	.. to 1000·0 g.	to 16 oz.

Soak the gelatin in one and a half times its weight of distilled water until softened, add the glycerin, and heat on a water-bath until the gelatin is dissolved and the mass weighs 850 grammes (13½ ounces); add the sucrose, citric acid and sodium benzoate previously dissolved in the triple orange-flower water, then add the oil of lemon, the solution of bordeaux B and sufficient distilled water to produce the required weight. Strain through muslin and allow to cool.

GRANULÆ EFFERVESCENTES
Effervescent Granules

Effervescent granules consist of an effervescing basis of citric and tartaric acids and sodium bicarbonate, with or without sugar, and other ingredients. The ingredients are thoroughly mixed, placed in a suitable vessel and heated to between 95° and 105°. When the mixture has, by careful manipulation, assumed a uniformly plastic condition, it is passed

through a sieve of suitable mesh to produce granules of the required size. The granules are dried at a temperature not exceeding 55° and should be **stored** in well-closed containers.

AMMONII BROMIDUM EFFERVESCENS

(Ammon. Brom. Efferv.)

Effervescent Ammonium Bromide

	Metric	*Imperial*
Ammonium Bromide	80 g.	1 oz. 122½ gr.
Sodium Bicarbonate	460 g.	7 oz. 157½ gr.
Tartaric Acid	240 g.	3 oz. 367½ gr.
Citric Acid	160 g.	2 oz. 245 gr.
Sucrose	160 g.	2 oz. 245 gr.

Prepare as described under Granulæ Effervescentes.

Dose.– 5 to 30 grammes (75 grains to 1 ounce).

CAFFEINÆ CITRAS EFFERVESCENS

(Caffein. Cit. Efferv.)

Effervescent Caffeine Citrate

	Metric	*Imperial*
Caffeine Citrate	40 g.	280 gr.
Sodium Bicarbonate	570 g.	9 oz. 52½ gr.
Tartaric Acid	300 g.	4 oz. 350 gr.
Citric Acid	195 g.	3 oz. 52½ gr.

Prepare as described under Granulæ Effervescentes.

Dose.– 4 to 8 grammes (1 to 2 drachms).

LITHII CITRAS EFFERVESCENS

(Lith. Cit. Efferv.)

Effervescent Lithium Citrate

	Metric	*Imperial*
Lithium Citrate	50 g.	350 gr.
Sodium Bicarbonate	580 g.	9 oz. 122½ gr.
Tartaric Acid	310 g.	4 oz. 420 gr.
Citric Acid	210 g.	3 oz. 157½ gr.

Prepare as described under Granulæ Effervescentes.

Dose.– 4 to 8 grammes (1 to 2 drachms).

MAGNESII SULPHAS EFFERVESCENS

(Mag. Sulph. Efferv.)

Effervescent Magnesium Sulphate

Synonym—Effervescent Epsom Salts.

	Metric	*Imperial*
Exsiccated Magnesium Sulphate	385 g.	6 oz. 70 gr.
Sodium Bicarbonate	360 g.	5 oz. 332½ gr.
Tartaric Acid	190 g.	3 oz. 17½ gr.
Citric Acid	125 g.	2 oz.
Sucrose	105 g.	1 oz. 297½ gr.

Prepare as described under Granulæ Effervescentes.

Dose.– For repeated administration, 4 to 12 grammes (1 to 3 drachms); for a single administration, 15 to 30 grammes (½ to 1 ounce).

PHENACETINUM EFFERVESCENS

(Phenacet. Efferv.)

Effervescent Phenacetin

	Metric	*Imperial*
Phenacetin	50 g.	350 gr.
Sodium Bicarbonate	460 g.	7 oz. 157½ gr.
Tartaric Acid	240 g.	3 oz. 367½ gr.
Citric Acid	175 g.	2 oz. 350 gr.
Sucrose	175 g.	2 oz. 350 gr.

Prepare as described under Granulæ Effervescentes.

Dose.– 4 to 8 grammes (1 to 2 drachms).

PHENACETINUM CUM CAFFEINA EFFERVESCENS

(Phenacet. c. Caffein. Efferv.)

Effervescent Phenacetin with Caffeine

	Metric	*Imperial*
Phenacetin	50 g.	350 gr.
Caffeine Citrate	15 g.	105 gr.
Sodium Bicarbonate	460 g.	7 oz. 157½ gr.
Tartaric Acid	240 g.	3 oz. 367½ gr.
Citric Acid	175 g.	2 oz. 350 gr.
Sucrose	160 g.	2 oz. 245 gr.

Prepare as described under Granulæ Effervescentes.

Dose.– 4 to 8 grammes (1 to 2 drachms).

PHENAZONUM EFFERVESCENS

(Phenazon. Efferv.)

Effervescent Phenazone

Synonym—Effervescent Antipyrin.

	Metric	*Imperial*
Phenazone	80 g.	1 oz. 122½ gr.
Sodium Bicarbonate	460 g.	7 oz. 157½ gr.
Tartaric Acid	240 g.	3 oz. 367½ gr.
Citric Acid	160 g.	2 oz. 245 gr.
Sucrose	160 g.	2 oz. 245 gr.

Prepare as described under Granulæ Effervescentes.

Dose.– 4 to 8 grammes (1 to 2 drachms).

PHENAZONUM CUM CAFFEINA EFFERVESCENS

(Phenazon. c. Caffein. Efferv.)

Effervescent Phenazone with Caffeine

Synonym—Effervescent Antipyrin with Caffeine.

	Metric	*Imperial*
Phenazone	80 g.	1 oz. 122½ gr.
Caffeine Citrate	15 g.	105 gr.
Sodium Bicarbonate	460 g.	7 oz. 157½ gr.
Tartaric Acid	240 g.	3 oz. 367½ gr.
Citric Acid	160 g.	2 oz. 245 gr.
Sucrose	145 g.	2 oz. 140 gr.

Prepare as described under Granulæ Effervescentes.

Dose.– 4 to 8 grammes (1 to 2 drachms).

PIPERAZINA EFFERVESCENS

(Piperaz. Efferv.)

Effervescent Piperazine

	Metric	*Imperial*
Piperazine	80 g.	1 oz. 122½ gr.
Sodium Bicarbonate	460 g.	7 oz. 157½ gr.
Tartaric Acid	240 g.	3 oz. 367½ gr.
Citric Acid	160 g.	2 oz. 245 gr.
Sucrose	160 g.	2 oz. 245 gr.

Prepare as described under Granulæ Effervescentes.

Dose.– 4 to 12 grammes (1 to 3 drachms).

POTASSII CITRAS EFFERVESCENS
(Pot. Cit. Efferv.)
Effervescent Potassium Citrate

	Metric	*Imperial*
Potassium Citrate	160 g.	2 oz. 245 gr.
Sodium Bicarbonate	460 g.	7 oz. 157½ gr.
Tartaric Acid	240 g.	3 oz. 367½ gr.
Citric Acid	140 g.	2 oz. 105 gr.
Sucrose	140 g.	2 oz. 105 gr.

Prepare as described under Granulæ Effervescentes.

Dose.– 4 to 8 grammes (1 to 2 drachms).

SODII CITRO-TARTRAS EFFERVESCENS
(Sod. Citro-Tart. Efferv.)
Effervescent Sodium Citro-Tartrate

	Metric	*Imperial*
Sodium Bicarbonate	510 g.	8 oz. 20 gr.
Tartaric Acid	270 g.	4 oz. 140 gr.
Citric Acid	180 g.	2 oz. 385 gr.
Sucrose	150 g.	2 oz. 175 gr.

Prepare as described under Granulæ Effervescentes.

Dose.– 4 to 8 grammes (1 to 2 drachms).

GUTTÆ
Drops for the Eye

Drops for the eye are solutions of alkaloids or other substances in water or oil. They are used for anæsthetic, antiseptic, diagnostic, mydriatic and miotic purposes. The apparatus used in the preparation of drops for the eye, the containers for the solutions, and also the solutions themselves, should be sterilised. Drops for the eye, isotonic with the lachrymal secretion, may be prepared as described under Collyria.

GUTTÆ COCAINÆ
(Gutt. Cocain.)
Cocaine Eye Drops

Synonym—Factory Eye Drops.

	Metric	*Imperial*
Cocaine	0·5 g.	5 gr.
Mercuric Chloride	0·033 g.	⅓ gr.
Dehydrated Alcohol	1·0 ml.	11 m.
Castor Oil	95·0 g.	950 gr.

Dissolve the cocaine in the castor oil, in a dry vessel, with the aid of gentle heat; allow to cool, add the mercuric chloride dissolved in the dehydrated alcohol, and mix. It should be **stored** protected from sunlight, and should not be used after long storage.

GUTTÆ FLUORESCEINÆ

(Gutt. Fluoresc.)

Fluorescein Eye Drops

Synonym—Liquor Fluoresceinæ.

	Metric	*Imperial*
Soluble Fluorescein	2 g.	35 gr.
Sterilised Water	to 100 ml.	to 4 fl. oz.

Dissolve.

GUTTÆ PHYSOSTIGMINÆ

(Gutt. Physostig.)

Physostigmine Eye Drops

Synonyms—Guttæ Eserinæ; Eserine Eye Drops.

	Metric	*Imperial*
Physostigmine Salicylate ..	1 g.	17½ gr.
Boric Acid	3 g.	52½ gr.
Sterilised Water	to 100 ml.	to 4 fl. oz.

Dissolve.

The solution should be freshly prepared, or, if **stored,** it should be kept in completely-filled, well-closed containers protected from light.

GUTTÆ PHYSOSTIGMINÆ OLEOSÆ

(Gutt. Physostig. Oleos.)

Eye Drops of Physostigmine in Oil

Synonym—Guttæ Eserinæ Oleosæ.

	Metric	*Imperial*
Physostigmine	0·5 g.	8¾ gr.
Castor Oil	to 100·0 ml.	to 4 fl. oz.

Dissolve with the aid of gentle heat.

GUTTÆ PILOCARPINÆ
(Gutt. Pilocarp.)

Pilocarpine Eye Drops

	Metric	*Imperial*
Pilocarpine Nitrate	0·5 g.	8¾ gr.
Sterilised Water	to 100·0 ml.	to 4 fl. oz.

Dissolve.

INFUSA

Infusions

Infusions are dilute solutions containing the water-soluble extractive of vegetable drugs. They are prepared by macerating drugs in distilled water for short periods of time, varying from fifteen minutes to two hours. The volume of the product is indefinite, depending upon the quantity of menstruum retained by the marc, which should not be pressed. The degree of comminution of the drug, the temperature at which infusion is commenced, and the period of maceration depend upon the nature of the drug and the constituents to be extracted.

Infusions should be prepared in earthenware vessels. If hot water is used in preparing the infusion, it should be weighed into the vessel, previously tared and warmed, and containing the drug, preferably suspended by some suitable contrivance, or enclosed in muslin so as to be immediately below the surface of the water; if the drug sinks to the bottom of the vessel, the mixture should be stirred occasionally. When the specified period of infusion has expired, the product is strained. It is important to remove the marc from infusions as soon as the period of maceration has elapsed, and it is usually necessary to allow the preparations to cool before use. Infusions of drugs containing an active principle which is easily soluble, and those containing an appreciable quantity of starch, are prepared with cold water.

Fresh infusions should be dispensed within twelve hours of their preparation. When an infusion is ordered, the fresh infusion not being specified, either the fresh infusion, or the concentrated infusion suitably diluted, may be dispensed. Concentrated infusions when diluted with seven times their volume of distilled water yield preparations which are approximately equivalent in strength, but not in flavour, to the corresponding fresh infusions, and differ also in containing a small proportion of alcohol. Concentrated infusions of drugs such as digitalis and ergot are unstable, and only the fresh infusions should be used.

Infusions for which special formulæ are not given, and for which there is no stated strength, may be prepared by infusing for fifteen minutes 50 grammes (1 ounce) of the drug, in coarse powder, in 1000 millilitres (20 fluid ounces) of boiling distilled water, and straining.

INFUSUM AURANTII COMPOSITUM CONCENTRATUM

(Inf. Aurant. Co. Conc.)

Concentrated Compound Infusion of Orange Peel

	Metric	*Imperial*
Dried Bitter-Orange Peel, cut small	200 g.	4 oz.
Dried Lemon Peel, cut small ..	80 g.	1 oz. 262 gr.
Clove, bruised	25 g.	½ oz.
Alcohol (25 per cent.)	1350 ml.	27 fl. oz.

Macerate in a covered vessel for forty-eight hours the dried bitter-orange peel, the dried lemon peel and the clove in 1000 millilitres (20 fluid ounces) of the alcohol and press out the liquid. To the pressed marc add the remainder of the alcohol and macerate for twenty-four hours; press, add the liquid to the product of the first pressing, allow to stand for not less than fourteen days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 21 to 24 per cent. v/v of ethyl alcohol.

INFUSUM AURANTII COMPOSITUM RECENS

(Inf. Aurant. Co. Rec.)

Fresh Compound Infusion of Orange Peel

	Metric	*Imperial*
Dried Bitter-Orange Peel, cut small	25 g.	½ oz.
Lemon Peel, cut small	10 g.	87½ gr.
Clove, bruised	5 g.	43¾ gr.
Distilled Water, boiling	1000 ml.	20 fl. oz.

Infuse in a covered vessel for fifteen minutes, and strain.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

For dispensing purposes, fresh compound infusion of orange peel should be used within twelve hours of its preparation.

When compound infusion of orange peel (Infusum Aurantii Compositum) is prescribed, fresh infusion not being specified, either Infusum Aurantii Compositum Recens, or Infusum Aurantii Compositum Concentratum diluted with seven times its volume of distilled water, may be dispensed.

INFUSUM CASCARILLÆ CONCENTRATUM

(Inf. Cascaril. Conc.)

Concentrated Infusion of Cascarilla

	Metric	*Imperial*
Cascarilla, in coarse powder ..	400 g.	8 oz.
Alcohol (25 per cent.)	1250 ml.	25 fl. oz.

Macerate the cascarilla in 1000 millilitres (20 fluid ounces) of the alcohol in a covered vessel for forty-eight hours and press out the liquid. To the pressed marc add the remainder of the alcohol and macerate for twenty-four hours; press, add the liquid to the product of the first pressing, allow to stand for not less than fourteen days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 18 to 21 per cent. v/v of ethyl alcohol.

INFUSUM CASCARILLÆ RECENS
(Inf. Cascaril. Rec.)
Fresh Infusion of Cascarilla

	Metric	*Imperial*
Cascarilla, in coarse powder ..	50 g.	1 oz.
Distilled Water, boiling	1000 ml.	20 fl. oz.

Infuse in a covered vessel for fifteen minutes, and strain.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

For dispensing purposes, fresh infusion of cascarilla should be used within twelve hours of its preparation.

When infusion of cascarilla (Infusum Cascarillæ) is prescribed, fresh infusion not being specified, either Infusum Cascarillæ Recens, or Infusum Cascarillæ Concentratum diluted with seven times its volume of distilled water, may be dispensed.

INFUSUM CHIRATÆ CONCENTRATUM
(Inf. Chirat. Conc.)
Concentrated Infusion of Chiretta

	Metric	*Imperial*
Chiretta, cut small	400 g.	8 oz.
Alcohol (25 per cent.)	to 1000 ml.	to 20 fl. oz.

Extract the chiretta with the alcohol by percolation, reserving the first 750 millilitres (15 fluid ounces) of percolate. Continue percolation until a further 1000 millilitres (20 fluid ounces) has been collected, evaporate to a syrupy consistence, dissolve the residue in the reserved portion and add, if necessary, sufficient of the alcohol to produce the required volume. Allow to stand for not less than fourteen days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 19 to 23 per cent. v/v of ethyl alcohol.

INFUSUM CHIRATÆ RECENS

(Inf. Chirat. Rec.)

Fresh Infusion of Chiretta

	Metric	*Imperial*
Chiretta, cut small	50 g.	1 oz.
Distilled Water, boiling	1000 ml.	20 fl. oz.

Infuse in a covered vessel for fifteen minutes, and strain.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

For dispensing purposes, fresh infusion of chiretta should be used within twelve hours of its preparation.

When infusion of chiretta (Infusum Chiratæ) is prescribed, fresh infusion not being specified, either Infusum Chiratæ Recens, or Infusum Chiratæ Concentratum diluted with seven times its volume of distilled water, may be dispensed.

INFUSUM CINCHONÆ ACIDUM CONCENTRATUM

(Inf. Cinchon. Acid. Conc.)

Concentrated Acid Infusion of Cinchona

	Metric	*Imperial*
Cinchona, in moderately fine powder	400 g.	8 oz.
Aromatic Sulphuric Acid ..	100 ml.	2 fl. oz.
Alcohol (20 per cent.)	to 1000 ml.	to 20 fl. oz.

Extract the cinchona with the alcohol by percolation, reserving the first 850 millilitres (17 fluid ounces) of percolate. Continue percolation until a further 1000 millilitres (20 fluid ounces) has been collected; evaporate to a syrupy consistence, dissolve the residue in the aromatic sulphuric acid, add to the reserved portion and add, if necessary, sufficient alcohol (20 per cent.), to produce the required volume. Allow to stand for not less than fourteen days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 24 to 27 per cent. v/v of ethyl alcohol.

INFUSUM CINCHONÆ ACIDUM RECENS

(Inf. Cinchon. Acid. Rec.)

Fresh Acid Infusion of Cinchona

	Metric	*Imperial*
Cinchona, in moderately fine powder	50·0 g.	1 oz.
Aromatic Sulphuric Acid ..	12·5 ml.	120 m.
Distilled Water, boiling	1000·0 ml.	20 fl. oz.

Mix the cinchona with the distilled water in a covered vessel, add the aromatic sulphuric acid, infuse for one hour, and strain.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

For dispensing purposes, fresh acid infusion of cinchona should be used within twelve hours of its preparation.

When acid infusion of cinchona (Infusum Cinchonæ Acidum) is prescribed, fresh infusion not being specified, either Infusum Cinchonæ Acidum Recens, or Infusum Cinchonæ Acidum Concentratum diluted with seven times its volume of distilled water, may be dispensed.

INFUSUM CUSPARIÆ CONCENTRATUM

(Inf. Cuspar. Conc.)

Concentrated Infusion of Cusparia

	Metric	*Imperial*
Cusparia, in moderately coarse powder	400 g.	8 oz.
Alcohol (25 per cent.)	1300 ml.	26 fl. oz.

Macerate the cusparia with 1000 millilitres (20 fluid ounces) of the alcohol in a covered vessel for forty-eight hours and press out the liquid; to the pressed marc add the remainder of the alcohol, macerate for twenty-four hours, press, add the liquid to the product of the first pressing, allow to stand for not less than fourteen days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 18 to 21 per cent. v/v of ethyl alcohol.

When infusion of cusparia (Infusum Cuspariæ) is prescribed, this concentrated infusion diluted with seven times its volume of distilled water may be dispensed.

INFUSUM ERGOTÆ RECENS

(Inf. Ergot. Rec.)

Fresh Infusion of Ergot

	Metric	*Imperial*
Ergot, freshly crushed	50 g.	1 oz.
Distilled Water, boiling	1000 ml.	20 fl. oz.

Infuse in a covered vessel for fifteen minutes, and strain.

Dose.– 30 to 60 millilitres (1 to 2 fluid ounces).

For dispensing purposes, fresh infusion of ergot should be used within twelve hours of its preparation.

When infusion of ergot (Infusum Ergotæ) is prescribed, Infusum Ergotæ Recens should be dispensed.

INFUSUM KRAMERIÆ CONCENTRATUM

(Inf. Kramer. Conc.)

Concentrated Infusion of Krameria

Synonym—Concentrated Infusion of Rhatany.

	Metric	*Imperial*
Krameria, in moderately coarse powder	400 g.	8 oz.
Alcohol (25 per cent.)	to 1000 ml.	to 20 fl. oz.

Extract the krameria with the alcohol by percolation reserving the first 750 millilitres (15 fluid ounces) of percolate. Continue percolation until a further 1000 millilitres (20 fluid ounces) has been collected; evaporate to a syrupy consistence, dissolve the residue in the reserved portion and add if necessary sufficient of the alcohol to produce the required volume. Allow to stand for not less than fourteen days and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 18 to 21 per cent. v/v of ethyl alcohol.

INFUSUM KRAMERIÆ RECENS

(Inf. Kramer. Rec.)

Fresh Infusion of Krameria

Synonym—Infusion of Rhatany.

	Metric	*Imperial*
Krameria, in coarse powder	50 g.	1 oz.
Distilled Water, boiling	1000 ml.	20 fl. oz.

Infuse in a covered vessel for fifteen minutes, and strain.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

For dispensing purposes, fresh infusion of krameria should be used within twelve hours of its preparation.

When infusion of krameria (Infusum Krameriæ) is prescribed, fresh infusion not being specified, either Infusum Krameriæ Recens, or Infusum Krameriæ Concentratum diluted with seven times its volume of distilled water, may be dispensed.

INFUSUM LINI

(Inf. Lini)

Infusion of Linseed

Synonym—Linseed Tea.

	Metric	*Imperial*
Linseed	34·3 g.	300 gr.
Liquorice, unpeeled, in coarse powder	11·4 g.	100 gr.
Distilled Water, boiling	1000·0 ml.	20 fl. oz.

Infuse in a covered vessel for fifteen minutes, and strain.

Dose.– 30 to 120 millilitres (1 to 4 fluid ounces).

For dispensing purposes, infusion of linseed should be used within twelve hours of its preparation.

INFUSUM LUPULI CONCENTRATUM
(Inf. Lupul. Conc.)

Concentrated Infusion of Lupulus

Synonym—Concentrated Infusion of Hops.

	Metric	*Imperial*
Lupulus, freshly broken.. ..	400 g.	8 oz.
Alcohol (25 per cent.)	1350 ml.	27 fl. oz.

Macerate the lupulus in 1000 millilitres (20 fluid ounces) of the alcohol in a covered vessel for forty-eight hours and press out the liquid. To the pressed marc add the remainder of the alcohol and macerate for twenty-four hours; press out the liquid, mix with the liquid previously obtained, allow to stand for not less than fourteen days, and filter.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Alcohol content, 18 to 21 per cent. v/v of ethyl alcohol.

When infusion of lupulus (Infusum Lupuli) is prescribed, this concentrated infusion, diluted with seven times its volume of distilled water, may be dispensed.

INFUSUM MARRUBII CONCENTRATUM
(Inf. Marrub. Conc.)

Concentrated Infusion of Horehound

	Metric	*Imperial*
Horehound, in moderately coarse powder	400 g.	8 oz.
Alcohol (25 per cent.)	1400 ml.	28 fl. oz.

Macerate the horehound with 1000 millilitres (20 fluid ounces) of the alcohol in a covered vessel for forty-eight hours and press out the liquid; to the pressed marc add the remainder of the alcohol, macerate for twenty-four hours, press, add the liquid to the product of the first pressing, allow to stand for not less than fourteen days, and filter.

Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

Alcohol content, 18 to 22 per cent. v/v of ethyl alcohol.

When infusion of horehound (Infusum Marrubii) is prescribed, this concentrated infusion, diluted with seven times its volume of distilled water, may be dispensed

INFUSUM RHEI CONCENTRATUM
(Inf. Rhei Conc.)

Concentrated Infusion of Rhubarb

	Metric	*Imperial*
Rhubarb, in moderately coarse powder	400 g.	8 oz.
Alcohol (25 per cent.)	to 1000 ml.	to 20 fl. oz.

Extract the rhubarb with the alcohol by percolation, reserving the first 750 millilitres (15 fluid ounces) of percolate. Continue percolation until a further 1000 millilitres (20 fluid ounces) has been collected, evaporate to a syrupy consistence, dissolve the residue in the reserved portion, and add, if necessary, sufficient of the alcohol to produce the required volume. Allow to stand for not less than fourteen days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 18 to 21 per cent. v/v of ethyl alcohol.

INFUSUM RHEI RECENS
(Inf. Rhei Rec.)

Fresh Infusion of Rhubarb

	Metric	*Imperial*
Rhubarb, in thin slices	50 g.	1 oz.
Distilled Water, boiling	1000 ml.	20 fl. oz.

Infuse in a covered vessel for fifteen minutes, and strain.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

For dispensing purposes, fresh infusion of rhubarb should be used within twelve hours of its preparation.

When infusion of rhubarb (Infusum Rhei) is prescribed, fresh infusion not being specified, either Infusum Rhei Recens, or Infusum Rhei Concentratum diluted with seven times its volume of distilled water, may be dispensed.

INFUSUM ROSÆ ACIDUM CONCENTRATUM
(Inf. Ros. Acid. Conc.)

Concentrated Acid Infusion of Roses

	Metric	*Imperial*
Red-Rose Petal, dried and broken	200 g.	4 oz.
Dilute Sulphuric Acid	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	250 ml.	5 fl. oz.
Chloroform Water	950 ml.	19 fl. oz.

Macerate the red-rose petal in 700 millilitres (14 fluid ounces) of chloroform water for forty-eight hours and press out the liquid; to the

pressed marc add the remainder of the chloroform water, macerate for twenty-four hours, press, and add the liquid to the product of the first pressing. Heat the mixed liquids to boiling, cool, add the acid and the alcohol, allow to stand for not less than fourteen days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 17 to 22 per cent. v/v of ethyl alcohol.

INFUSUM ROSÆ ACIDUM RECENS

(Inf. Ros. Acid. Rec.)

Fresh Acid Infusion of Roses

	Metric	*Imperial*
Red-Rose Petal, dried and broken	25·0 g.	½ oz.
Dilute Sulphuric Acid	12·5 ml.	120 m.
Distilled Water, boiling	1000·0 ml.	20 fl. oz.

Add the dilute sulphuric acid to the distilled water, infuse the red-rose petal in the mixture in a covered vessel for fifteen minutes, and strain.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

For dispensing purposes, fresh acid infusion of roses should be used within twelve hours of its preparation.

When acid infusion of roses (Infusum Rosæ Acidum) is prescribed, fresh infusion not being specified, either Infusum Rosæ Acidum Recens, or Infusum Rosæ Acidum Concentratum diluted with seven times its volume of distilled water, may be dispensed.

INFUSUM SCOPARII CONCENTRATUM

(Inf. Scopar. Conc.)

Concentrated Infusion of Scoparium

Synonym—Concentrated Infusion of Broom.

	Metric	*Imperial*
Scoparium, in moderately coarse powder	800 g.	16 oz.
Alcohol (25 per cent.)	to 1000 ml.	to 20 fl. oz.

Extract the scoparium with the alcohol by percolation, reserving the first 750 millilitres (15 fluid ounces) of percolate. Continue percolation until a further 1000 millilitres (20 fluid ounces) has been collected, evaporate to a syrupy consistence, dissolve the residue in the reserved portion and add, if necessary, sufficient of the alcohol to produce the required volume. Allow to stand for not less than fourteen days, and filter.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Alcohol content, 17 to 22 per cent. v/v of ethyl alcohol.

INFUSUM SCOPARII RECENS

(Inf. Scopar. Rec.)

Fresh Infusion of Scoparium

Synonym—Fresh Infusion of Broom.

	Metric	*Imperial*
Scoparium, dried and bruised ..	100 g.	2 oz.
Distilled Water, boiling	1000 ml.	20 fl. oz.

Infuse in a covered vessel for fifteen minutes, and strain.

Dose.– 30 to 60 millilitres (1 to 2 fluid ounces).

For dispensing purposes, fresh infusion of scoparium should be used within twelve hours of its preparation.

When infusion of scoparium (Infusum Scoparii) is prescribed, fresh infusion not being specified, either Infusum Scoparii Recens, or Infusum Scoparii Concentratum diluted with seven times its volume of distilled water, may be dispensed.

INFUSUM SERPENTARIÆ CONCENTRATUM

(Inf. Serpent. Conc.)

Concentrated Infusion of Serpentary

	Metric	*Imperial*
Serpentary, in moderately coarse powder	400 g.	8 oz.
Alcohol (25 per cent.)	to 1000 ml.	to 20 fl. oz.

Extract the serpentary with the alcohol by percolation, reserving the first 750 millilitres (15 fluid ounces) of percolate. Continue percolation until a further 1000 millilitres (20 fluid ounces) has been collected; evaporate to a syrupy consistence, dissolve the residue in the reserved portion and add, if necessary, sufficient of the alcohol to produce the required volume. Allow to stand for not less than fourteen days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 19 to 22 per cent. v/v of ethyl alcohol.

When infusion of serpentary (Infusum Serpentariæ) is prescribed, this concentrated infusion, diluted with seven times its volume of distilled water, may be dispensed.

INFUSUM UVÆ URSI CONCENTRATUM

(Inf. Uvæ Ursi Conc.)

Concentrated Infusion of Bearberry

	Metric	*Imperial*
Bearberry, in moderately coarse powder	400 g.	8 oz.
Alcohol (25 per cent.)	to 1000 ml.	to 20 fl. oz.

Extract the bearberry with the alcohol by percolation, reserving the first 750 millilitres (15 fluid ounces) of percolate. Continue percolation until a further 1000 millilitres (20 fluid ounces) has been collected; evaporate to a syrupy consistence, dissolve the residue in the reserved portion, and add, if necessary, sufficient of the alcohol to produce the required volume. Allow to stand for not less than fourteen days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 18 to 21 per cent. v/v of ethyl alcohol.

INFUSUM UVÆ URSI RECENS

(Inf. Uvæ Ursi Rec.)

Fresh Infusion of Bearberry

	Metric	*Imperial*
Bearberry, bruised	50 g.	1 oz.
Distilled Water, boiling	1000 ml.	20 fl. oz.

Infuse in a covered vessel for fifteen minutes, and strain.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

For dispensing purposes, fresh infusion of bearberry should be used within twelve hours of its preparation.

When infusion of bearberry (Infusum Uvæ Ursi) is prescribed, fresh infusion not being specified, either Infusum Uvæ Ursi Recens, or Infusum Uvæ Ursi Concentratum diluted with seven times its volume of distilled water, may be dispensed.

INFUSUM VALERIANÆ CONCENTRATUM

(Inf. Valerian. Conc.)

Concentrated Infusion of Valerian

	Metric	*Imperial*
Valerian, in moderately coarse powder	200 g.	4 oz.
Alcohol (25 per cent.)	to 1000 ml.	to 20 fl. oz.

Extract the valerian with the alcohol by percolation, reserving the first 750 millilitres (15 fluid ounces) of percolate. Continue percolation until a further 1000 millilitres (20 fluid ounces) has been collected; evaporate to a syrupy consistence, dissolve the residue in the reserved portion, and add, if necessary, sufficient of the alcohol to produce the required volume. Allow to stand for not less than fourteen days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 20 to 23 per cent. v/v of ethyl alcohol.

INFUSUM VALERIANÆ RECENS
(Inf. Valerian. Rec.)

Fresh Infusion of Valerian

	Metric	*Imperial*
Valerian, bruised..	25 g.	½ oz.
Distilled Water, boiling	1000 ml.	20 fl. oz.

Infuse in a covered vessel for fifteen minutes, and strain.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

For dispensing purposes, fresh infusion of valerian should be used within twelve hours of its preparation.

When infusion of valerian (Infusum Valerianæ) is prescribed, fresh infusion not being specified, either Infusum Valerianæ Recens, or Infusum Valerianæ Concentratum diluted with seven times its volume of distilled water, may be dispensed.

INJECTIONES
Injections

Injections may be divided into two main classes, those intended for introduction through the skin, and those which are passed directly through the external orifices of the body. The former class may be subdivided into the following groups of injections:—(1) Intradermal; (2) Hypodermic or Subcutaneous; (3) Intramuscular; (4) Intravenous; (5) Intraspinal, intrathecal, or intracisternal. Injections coming within these five groups must be sterile, and in addition, when intended for intravenous use, they should usually be rendered isotonic with blood serum. Whenever possible, solutions or suspensions intended for injection through the skin should be dispensed in ampoules. Special processes to be used in preparing and sterilising solutions for injection, and methods for sterilising vessels and containers, are described in Appendix XII. Tests for the alkalinity of glass and tests for sterility are described in the British Pharmacopœia. All sera and vaccines should be stored in a dark, cool place, preferably in an ice-safe or refrigerator.

Intradermal Injections are given between the layers of the skin, and this method is used for applying skin tests for specific immunity, and for obtaining reactions for the diagnosis of protein sensitivity. Certain vaccines may be administered intradermally.

Hypodermic or **Subcutaneous Injections** are usually aqueous solutions. The concentration of a hypodermic or subdermal injection is adjusted usually so that the volume injected is small, varying from 0·2 to 1 millilitre (3 to 15 minims). Ethereal or oily solutions and suspensions of potent drugs, anæsthetics, or vaccines may also be given in this way. Deep injections of large volume may be administered by gravitational methods into the deeper folds of the skin.

Intramuscular Injections may be sera, solutions or suspensions in sterilised water, or aqueous or oily suspensions of certain metals or their salts in a state of fine subdivision.

Intravenous Injections should be carefully filtered free from solid particles. The quantities administered into the blood stream may be small, 1 to 5 millilitres (15 to 75 minims) if potent solutions are given, or large, from 150 to 900 millilitres (5 to 30 fluid ounces) if isotonic solutions are given. Certain sera may be given intravenously.

Intraspinal or **Intrathecal Injections** are usually solutions for the production of varying degrees of anæsthesia, and may contain substances to increase the specific gravity of the liquid to enable its action to be localised. Sera are given intrathecally, intraspinally, or intracisternally for certain specific diseases.

Preparations for injection into cavities of the body may be subdivided into the following groups:—(1) Nasal; (2) Aural; (3) Rectal; (4) Urethral; (5) Vaginal. These preparations are frequently termed lotions and are used for irrigation and other purposes. They should be dispensed in bottles distinguishable from those used for preparations intended for oral administration.

Nasal Injections are usually solutions of antiseptics in oil or water, and are administered by means of a rubber or glass syringe, or by spray-producing apparatus.

Aural Injections are usually aqueous lotions which are administered by means of a syringe. 300 to 600 millilitres (10 to 20 fluid ounces) may be used as a wash.

Rectal Injections are described under Enemata.

Urethral Injections are usually antiseptic or astringent solutions or suspensions. The quantities usually injected are 8 to 16 millilitres (2 to 4 fluid drachms). The urethral route is used for bladder injections or for the introduction into the bladder or the pelvis of the kidney of certain shadow-producing solutions for X-ray diagnosis. Warm lotions and suspensions are used as bladder injections. These should be sterile.

Vaginal Injections are usually concentrated solutions which are diluted to a suitable strength immediately before use. They are usually sedative, antiseptic, or astringent, and 600 to 1200 millilitres (20 to 40 fluid ounces) is used at a time.

Isotonic Solutions.—To make a solution of any one of the following substances so that it is isotonic with blood serum, the quantity given below should be dissolved in sufficient water to produce 100 millilitres (4 fluid ounces):—

Borax	2·90 grammes	(50¾ grains)
Calcium Chloride	1·18 grammes	(20½ grains)
Dextrose	5·10 grammes	(89¼ grains)
Magnesium Sulphate	6·35 grammes	(111 grains)
Potassium Sulphate	1·12 grammes	(19½ grains)
Sodium Bicarbonate	1·35 grammes	(23½ grains)
Sodium Bromide	1·77 grammes	(31 grains)
Sodium Chloride	0·91 gramme	(16 grains)
Sodium Phosphate	4·53 grammes	(79¼ grains)

If an aqueous solution of a medicament is required to be rendered isotonic with blood serum by the addition of another substance, the amount to be added, W, may be calculated approximately from the formula

$$W = \frac{0{\cdot}56 - a}{b} \text{ per cent. w/v,}$$

where *a* denotes the freezing-point of the unadjusted solution in degrees below 0° and *b* denotes the depression of the freezing-point of water produced by 1 per cent. w/v of the adjusting substance.

The following table gives the depression of the freezing-point of water produced by 1 per cent. w/v of a number of substances commonly required in injections or suitable for adding to injections in order to render them isotonic, and the figures in the table, therefore, are the values of *b* for use in the above formula. The value of *a* for any prescribed strength of a substance may be found by multiplying the strength expressed as a percentage w/v by the value of *b* for the same substance.

Alum	0·10
Atropine Sulphate	0·074
Borax	0·22
Boric Acid	0·25
Cocaine Hydrochloride	0·12
Dextrose	0·10
Emetine Hydrochloride	0·088
Magnesium Sulphate	0·08
Morphine Hydrochloride	0·096
Procaine Hydrochloride	0·14
Silver Nitrate	0·20
Sodium Benzoate	0·31
Sodium Bicarbonate	0·40
Sodium Chloride	0·585
Sodium Nitrate	0·40
Sodium Sulphate	0·15
Sucrose	0·054

INJECTIO CAMPHORÆ

(Inj. Camph.)

Injection of Camphor

	Metric	*Imperial*
Camphor	10 g.	175 gr.
Olive Oil	to 100 ml.	to 4 fl. oz.

Heat about 100 millilitres (4 fluid ounces) of olive oil at 150° for one hour, and cool. Dissolve the camphor in a portion of the oil, and add sufficient of the oil to produce the required volume; transfer to suitable sterilised containers, and sterilise by heating at 100° for thirty minutes, by heating in an autoclave, or by tyndallisation.

Dose.– 0·5 to 2 millilitres (8 to 30 minims), by subcutaneous injection.

INJECTIO CAMPHORÆ ÆTHEREA
(Inj. Camph. Æther.)
Ethereal Injection of Camphor

Synonym—Curschmann's Solution.

	Metric	*Imperial*
Camphor	20 g.	350 gr.
Ether	30 ml.	1 fl. oz. 96 m.
Olive Oil	to 100 ml.	to 4 fl. oz.

Heat about 100 millilitres (4 fluid ounces) of olive oil at 150° for one hour, and cool. Dissolve the camphor in a portion of the oil, and add sufficient of the oil to produce 70 millilitres (2 fluid ounces 384 minims); sterilise by heating at 100° for thirty minutes in a closed vessel, by heating in an autoclave, or by tyndallisation, add the ether, and mix.

Dose.– 0·25 to 1 millilitre (4 to 15 minims), by subcutaneous injection.

INJECTIO DIGITALINI
(Inj. Digitalin.)
Injection of Digitalin

	Metric	*Imperial*
Digitalin	3 g.	52½ gr.
Distilled Water	to 100 ml.	to 4 fl. oz.

Dissolve. Sterilise by tyndallisation or by filtration. It should be recently prepared and **stored** protected from light.

Dose.– For a single administration, 1 to 2 millilitres (¼ to ½ fluid drachm), by subcutaneous injection; for repeated administration, 0·2 to 0·4 millilitre (3 to 6 minims), by subcutaneous injection.

INJECTIO FERRI ET ARSENI
(Inj. Ferr. et Arsen.)
Injection of Iron and Arsenic

	Metric	*Imperial*
Strong Solution of Ferric Chloride	1·75 ml.	33½ m.
Citric Acid	2·00 g.	35 gr.
Arsenic Trioxide	0·13 g.	2¼ gr.
Dilute Solution of Ammonia ..	a sufficient quantity	
Sterilised Water	to 100·0 ml.	to 4 fl. oz.

Mix the strong solution of ferric chloride with 40 millilitres (1½ fluid ounces) of distilled water and add the mixture very gradually, with constant stirring, to a mixture of 6 millilitres (120 minims) of dilute solution of ammonia and 25 millilitres (1 fluid ounce) of distilled water; allow to stand for two hours, stirring every quarter of an hour; filter, using slight suction, and wash the precipitate with distilled water until

completely free from chloride. Suspend the precipitate in 20 millilitres (384 minims) of sterilised water and add the suspension to a hot solution of the citric acid in 5 millilitres (96 minims) of sterilised water, adding a small portion at first and allowing it to dissolve before adding the bulk of the suspension. Maintain the mixture at a temperature just below the boiling-point for forty-five minutes, then add a further 20 millilitres (384 minims) of sterilised water and the arsenic trioxide dissolved with the aid of gentle heat in a mixture of 15 millilitres (288 minims) of sterilised water and 1 millilitre (20 minims) of dilute solution of ammonia. Finally add 1·5 millilitres (30 minims) of dilute solution of ammonia or sufficient to give a reaction not acid to methyl red and not alkaline to phenol red, and sufficient sterilised water to produce the required volume. Sterilise by heating in an autoclave or by tyndallisation.

It should be **stored** protected from light.

Dose.– 0·5 to 1 millilitre (8 to 15 minims), by intramuscular injection.

INJECTIO HYDRARGYRI FORTIS

(Inj. Hydrarg. Fort.)

Strong Injection of Mercury

Synonyms—Oleum Cinereum; Grey Oil.

	Metric	*Imperial*
Mercury	40 g.	2 oz.
Wool Fat	26 g.	1 oz. 131¼ gr.
Liquid Paraffin	70 ml.	3½ fl. oz.

Heat the wool fat and the liquid paraffin separately at 150° for one hour; triturate the mercury and the wool fat in a sterilised mortar until metallic globules cease to be visible under a lens magnifying four diameters, and gradually add the liquid paraffin with constant trituration.

Dose.– 0·06 to 0·12 millilitre (1 to 2 minims), by intramuscular injection.

INJECTIO MORPHINÆ

(Inj. Morph.)

Injection of Morphine

	Metric	*Imperial*
Morphine Hydrochloride ..	2·5 g.	43¾ gr.
Sterilised Water	to 100·0 ml.	to 4 fl. oz.

Dissolve, and sterilise by heating in an autoclave, by tyndallisation, or filtration.

Dose.– 0·2 to 0·6 millilitre (3 to 10 minims), by subcutaneous injection.

INJECTIO PEPTONI
(Inj. Pepton.)

Injection of Peptone

	Metric	*Imperial*
Peptone	5·0 g.	87½ gr.
Sodium Chloride	0·9 g.	15¾ gr.
Sodium Hydroxide	a sufficient quantity	
Phenol	0·5 g.	8¾ gr.
Sterilised Water for Intravenous Injections	to 100·0 ml.	to 4 fl. oz.

Dissolve the peptone and the sodium chloride in about 90 millilitres (3½ fluid ounces) of the sterilised water with the aid of heat. Add to the solution a 1 per cent. w/v solution of sodium hydroxide in the sterilised water until the liquid is neutral to litmus or to phenol red; dissolve the phenol in the product, filter, and pass sufficient of the sterilised water through the filter to produce the required volume; sterilise by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·2 millilitre (3 minims) gradually increased to 1·5 millilitres (25 minims), by intravenous injection.

When Injectio Peptoni is required for intramuscular injection, it should be prepared with 7·5 grammes (131¼ grains) of peptone.

INJECTIO QUININÆ ET URETHANI
(Inj. Quinin. et Urethan.)

Injection of Quinine and Urethane

	Metric	*Imperial*
Quinine Hydrochloride	13·33 g.	232¾ gr.
Urethane	6·67 g.	116¾ gr.
Sterilised Water for Intravenous Injections	to 100·00 ml.	to 4 fl. oz.

Dissolve, and sterilise by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·5 to 5 millilitres (8 to 75 minims), by intravenous injection.

INJECTIO SODII MORRHUATIS
(Inj. Sod. Morrh.)

Injection of Sodium Morrhuate

	Metric	*Imperial*
Sodium Morrhuate	5 g.	87½ gr.
Alcohol (90 per cent.)	1 ml.	19 m.
Sterilised Water for Intravenous Injections	to 100 ml.	to 4 fl. oz.

Dissolve, and sterilise by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·5 to 5 millilitres (8 to 75 minims), by intravenous injection.

When solid matter separates, it should be redissolved by warming, and the injection should be used with a syringe, previously warmed.

INJECTIO STRYCHNINÆ

(Inj. Strych.)

Injection of Strychnine

	Metric	*Imperial*
Strychnine Hydrochloride ..	0·75 g.	13⅛ gr.
Sterilised Water	.. to 100·00 ml.	to 4 fl. oz.

Dissolve, and sterilise by heating in an autoclave, by tyndallisation, or by filtration.

Dose.– 0·3 to 0·6 millilitre (5 to 10 minims), by subcutaneous injection.

INJECTIO THIOSINAMINÆ ET SODII SALICYLATIS

(Inj. Thiosinam. et Sod. Salicyl.)

Injection of Thiosinamine and Sodium Salicylate

	Metric	*Imperial*
Thiosinamine	10·0 g.	175 gr.
Sodium Salicylate	13·8 g.	241½ gr.
Glycerin	5·0 ml.	96 m.
Sterilised Water	to 100·0 ml.	to 4 fl. oz.

Dissolve the sodium salicylate in about 80 millilitres (3½ fluid ounces) of sterilised water and add the glycerin; dissolve the thiosinamine in the solution and add sufficient sterilised water to produce the required volume. Sterilise by tyndallisation or by filtration.

It should be recently prepared.

Dose.– 0·5 to 1 millilitre (8 to 15 minims), by subcutaneous or intramuscular injection.

INSUFFLATIONES

Insufflations

Insufflations are powders prepared for introduction into the ear, nose, or throat. They are administered by means of an insufflator or, when intended for the nose, they may be used in the same way as ordinary snuff.

INSUFFLATIO ADRENALINÆ
(Insuff. Adrenal.)

Adrenaline Insufflation

Synonym—Adrenaline Snuff.

	Metric	*Imperial*
Adrenaline	0·1 g.	1 gr.
Boric Acid	24·0 g.	240 gr.
Camphor	2·0 g.	20 gr.
Menthol	6·0 g.	60 gr.
Oil of Eucalyptus	1·0 ml.	11 m.
Potassium Chlorate	12·0 g.	120 gr.
Lycopodium	87·5 g.	2 oz.

Reduce the adrenaline, boric acid, camphor and menthol to fine powder, add the potassium chlorate previously powdered, and mix with the oil of eucalyptus and lycopodium.

It should be **stored** in well-closed containers in a cool place.

INSUFFLATIO BISMUTHI ET MORPHINÆ
(Insuff. Bism. et Morph.)

Bismuth and Morphine Insufflation

Synonyms—Ferrier's Snuff; Bismuth and Morphine Snuff.

	Metric	*Imperial*
Bismuth Subnitrate	75·0 g.	3 oz.
Morphine Hydrochloride ..	0·4 g.	7½ gr.
Acacia, in powder	to 100·0 g.	to 4 oz.

Mix.

INSUFFLATIO MENTHOLIS
(Insuff. Menthol.)

Menthol Insufflation

Synonyms—Insufflatio Mentholis Composita; Menthol Snuff.

	Metric	*Imperial*
Menthol	5 g.	87½ gr.
Ammonium Chloride	10 g.	175 gr.
Boric Acid	20 g.	350 gr.
Lycopodium	to 100 g.	to 4 oz.

Reduce the menthol, ammonium chloride and boric acid to fine powder and mix with sufficient lycopodium to produce the required weight.

INSUFFLATIO MENTHOLIS ET COCAINÆ

(Insuff. Menthol. et Cocain.)

Menthol and Cocaine Insufflation

Synonym—Menthol and Cocaine Snuff.

	Metric	*Imperial*
Menthol	2·5 g.	43¾ gr.
Cocaine Hydrochloride	0·14 g.	2½ gr.
Ammonium Chloride	25·0 g.	1 oz.
Camphor	5·0 g.	87½ gr.
Lycopodium	to 100·0 g.	to 4 oz.

Reduce the menthol, cocaine hydrochloride, ammonium chloride and camphor to fine powder and mix with sufficient lycopodium to produce the required weight.

LINCTI

Linctuses

Linctuses are liquid preparations of a mucilaginous, syrupy, or viscous nature containing substances which possess demulcent, expectorant, or sedative properties. They are usually administered in small doses and should be directed to be sipped and swallowed slowly without the addition of water, so that they may form a temporary protective or remedial film over the membrane of the throat.

LINCTUS ACIDUS

(Linct. Acid.)

Acid Linctus

	Metric	*Imperial*
Oxymel	333·3 ml.	6 fl. oz. 320 m.
Dilute Sulphuric Acid	83·3 ml.	1 fl. oz. 320 m.
Emulsion of Chloroform	33·3 ml.	320 m.
Treacle	to 1000·0 ml.	to 20 fl. oz.

Mix the dilute sulphuric acid and the emulsion of chloroform with the oxymel and add sufficient treacle to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LINCTUS CAMPHORÆ COMPOSITUS
(Linct. Camph. Co.)
Compound Linctus of Camphor

	Metric	*Imperial*
Camphorated Tincture of Opium	250·0 ml.	5 fl. oz.
Emulsion of Chloroform ..	125·0 ml.	2½ fl. oz.
Syrup of Wild Cherry	200·0 ml.	4 fl. oz.
Oxymel of Squill..	200·0 ml.	4 fl. oz.
Solution of Bordeaux B ..	10·4 ml.	100 m.
Concentrated Infusion of Senega to	1000·0 ml.	to 20 fl. oz.

Mix, allow to stand for not less than two days, and filter, using purified talc or kaolin if necessary.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

LINCTUS CODEINÆ
(Linct. Codein.)
Linctus of Codeine

	Metric	*Imperial*
Syrup of Codeine Phosphate ..	500·0 ml.	10 fl. oz.
Citric Acid	17·5 g.	153 gr.
Emulsion of Chloroform ..	50·0 ml.	1 fl. oz.
Glycerin	165·0 ml.	3 fl. oz. 144 m.
Mucilage of Tragacanth .. to	1000·0 ml.	to 20 fl. oz.

Dissolve the citric acid in the syrup of codeine phosphate and add the glycerin, emulsion of chloroform, and sufficient mucilage of tragacanth to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LINCTUS DIAMORPHINÆ
(Linct. Diamorph.)
Linctus of Diamorphine

	Metric	*Imperial*
Diamorphine Hydrochloride ..	1 g.	8¾ gr.
Tincture of Hyoscyamus ..	75 ml.	1½ fl. oz.
Spirit of Chloroform	75 ml.	1½ fl. oz.
Syrup of Tolu	150 ml.	3 fl. oz.
Syrup of Wild Cherry	150 ml.	3 fl. oz.
Glycerin to	1000 ml.	to 20 fl. oz.

Mix the tincture of hyoscyamus with the spirit of chloroform and dissolve the diamorphine hydrochloride in the mixture; add the syrup of tolu, the syrup of wild cherry and sufficient glycerin to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

LINCTUS DIAMORPHINÆ CAMPHORATUS

(Linct. Diamorph. Camph.)

Camphorated Linctus of Diamorphine

	Metric	*Imperial*
Diamorphine Hydrochloride ..	0·46 g.	4 gr.
Camphor	0·46 g.	4 gr.
Benzoic Acid	0·69 g.	6 gr.
Oil of Anise	0·52 ml.	5 m.
Liquid Extract of Ipecacuanha ..	12·5 ml.	120 m.
Tincture of Squill	75·0 ml.	1½ fl. oz.
Syrup	to 1000·0 ml.	to 20 fl. oz.

Dissolve the diamorphine hydrochloride, camphor, benzoic acid and oil of anise in the tincture of squill; add the liquid extract of ipecacuanha and sufficient syrup to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LINCTUS DIAMORPHINÆ CUM IPECACUANHA

(Linct. Diamorph. c. Ipecac.)

Linctus of Diamorphine with Ipecacuanha

	Metric	*Imperial*
Diamorphine Hydrochloride ..	0·46 g.	4 gr.
Liquid Extract of Ipecacuanha ..	12·5 ml.	120 m.
Tincture of Hyoscyamus ..	75·0 ml.	1½ fl. oz.
Spirit of Chloroform	75·0 ml.	1½ fl. oz.
Syrup of Tolu	150·0 ml.	3 fl. oz.
Syrup of Wild Cherry	150·0 ml.	3 fl. oz.
Glycerin	to 1000·0 ml.	to 20 fl. oz.

Mix the tincture of hyoscyamus with the spirit of chloroform and dissolve the diamorphine hydrochloride in the mixture; add the liquid extract of ipecacuanha, syrup of tolu, syrup of wild cherry and sufficient glycerin to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LINCTUS DIAMORPHINÆ ET SCILLÆ

(Linct. Diamorph. et Scill.)

Linctus of Diamorphine and Squill

	Metric	*Imperial*
Diamorphine Hydrochloride ..	0·46 g.	4 gr.
Sodium Antimonyltartrate ..	0·91 g.	8 gr.
Liquid Extract of Squill ..	50·0 ml.	1 fl. oz.
Liquid Extract of Senega ..	50·0 ml.	1 fl. oz.
Glycerin	100·0 ml.	2 fl. oz.
Syrup	to 1000·0 ml.	to 20 fl. oz.

Dissolve the diamorphine hydrochloride and the sodium antimonyltartrate in a portion of the syrup; add the liquid extract of squill, liquid extract of senega, glycerin and sufficient syrup to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LINCTUS DIAMORPHINÆ ET THYMI

(Linct. Diamorph. et Thym.)

Linctus of Diamorphine and Thyme

	Metric	*Imperial*
Diamorphine Hydrochloride ..	0·46 g.	4 gr.
Apomorphine Hydrochloride ..	0·57 g.	5 gr.
Distilled Water	50·0 ml.	1 fl. oz.
Liquid Extract of Thyme ..	250·0 ml.	5 fl. oz.
Solution of Tolu	62·5 ml.	1¼ fl. oz.
Glycerin	to 1000·0 ml.	to 20 fl. oz.

Dissolve the diamorphine hydrochloride and the apomorphine hydrochloride in the distilled water; add the liquid extract of thyme, the solution of tolu and sufficient glycerin to produce the required volume

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LINCTUS SCILLÆ
(Linct. Scill.)

Linctus of Squill

Synonyms—Linctus; Simple Linctus.

	Metric	*Imperial*
Oxymel of Squill	250 ml.	5 fl. oz.
Mucilage of Tragacanth ..	250 ml.	5 fl. oz.
Glycerin	250 ml.	5 fl. oz.
Emulsion of Chloroform ..	50 ml.	1 fl. oz.
Syrup	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LINCTUS SCILLÆ COMPOSITUS
(Linct. Scill. Co.)

Compound Linctus of Squill

Synonyms—Linctus Scillæ Opiatus; Opiate Linctus of Squill; Gee's Linctus.

	Metric	*Imperial*
Camphorated Tincture of Opium	250 ml.	5 fl. oz.
Oxymel of Squill	250 ml.	5 fl. oz.
Syrup of Tolu	250 ml.	5 fl. oz.

Mix.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LINIMENTA
Liniments

Liniments are usually liquid or semi-liquid preparations which are intended for external application and may contain substances possessing anodyne, rubefacient, sedative, or stimulating properties. Anodyne and sedative liniments are intended to be absorbed by the skin, and should be prepared with a spirituous medium or with a mixture of volatile and fixed oils. They may be directed to be applied to the skin on warmed flannel or other suitable material, or by means of a camel-hair brush. They should not be applied to broken surfaces. Stimulating liniments should be applied to the skin with considerable friction by massaging with the hand. These also should only be applied to unbroken surfaces. Liniments intended as soothing or protective coverings may be applied freely on any soft material such as lint, and may be renewed frequently.

All liniments should be dispensed in containers easily distinguishable by touch from those used for medicines intended for internal administration and, in addition to any prescribed directions, the container should always be labelled "Not to be taken internally."

LINIMENTUM ACONITI OLEOSUM
(Lin. Aconit. Oleos.)

Liniment of Aconite with Oil

Synonym—A.B.C. Liniment.

	Metric	*Imperial*
Liniment of Aconite	500 ml.	10 fl. oz.
Liniment of Belladonna ..	500 ml.	10 fl. oz.
Liniment of Chloroform ..	500 ml.	10 fl. oz.

Shake together. (This liniment must be well shaken before use.)

The non-oily liniment of the British Pharmaceutical Codex, 1923, is included under the name of Pigmentum Aconiti Compositum.

LINIMENTUM ALBUM
(Lin. Alb.)

White Liniment

Synonyms—Egg Liniment; White Embrocation; Linimentum Album Aceticum.

	Metric	*Imperial*
Acetic Acid	85 ml.	1 fl. oz. 336 m.
Oil of Turpentine	400 ml.	8 fl. oz.
Yolk and White of Egg	100 ml.	2 fl. oz.
Distilled Water	415 ml.	8 fl. oz. 144 m.

Triturate the yolk and white of egg in a mortar and gradually add the acetic acid diluted with about 200 millilitres (4 fluid ounces) of the water. Add the remainder of the water, strain through muslin into a suitable bottle, add the oil of turpentine, and shake for five minutes.

LINIMENTUM AMMONIÆ
(Lin. Ammon.)

Liniment of Ammonia

	Metric	*Imperial*
Dilute Solution of Ammonia ..	250 ml.	5 fl. oz.
Oleic Acid	25 ml.	½ fl. oz.
Liquid Paraffin	725 ml.	14½ fl. oz.

Mix the oleic acid with the liquid paraffin, add the dilute solution of ammonia, and shake.

LINIMENTUM ARNICÆ

(Lin. Arnic.)

Liniment of Arnica

Synonym—Arnica Opodeldoc.

	Metric	*Imperial*
Hard Soap	200 g.	4 oz.
Tincture of Arnica Root ..	250 ml.	5 fl. oz.
Camphor	50 g.	1 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Dissolve the hard soap in a mixture of the tincture of arnica root and 500 millilitres (10 fluid ounces) of the alcohol on a water-bath, dissolve the camphor in the solution and add sufficient of the alcohol to produce the required volume; pour into suitable bottles and allow to solidify.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, and the tincture of arnica root may be replaced by tincture of arnica root prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LINIMENTUM BELLADONNÆ CUM CHLOROFORMO

(Lin. Bellad. c. Chlorof.)

Liniment of Belladonna with Chloroform

	Metric	*Imperial*
Chloroform	125 ml.	2½ fl. oz.
Liniment of Belladonna	to 1000 ml.	to 20 fl. oz.

Mix.

LINIMENTUM CALAMINÆ

(Lin. Calamin.)

Liniment of Calamine

	Metric	*Imperial*
Calamine	45·7 g.	400 gr.
Zinc Oxide	34·3 g.	300 gr.
Oleic Acid	5·0 ml.	48 m.
Wool Fat	10·0 g.	87½ gr.
Liquid Paraffin	485·0 ml.	9 fl. oz. 336 m.
Solution of Calcium Hydroxide ..	500·0 ml.	10 fl. oz.

Melt the wool fat in the liquid paraffin with the aid of gentle heat and add the oleic acid. Gradually add this mixture, with constant trituration, to the calamine and zinc oxide previously mixed with the solution of calcium hydroxide.

LINIMENTUM CALAMINÆ COMPOSITUM
(Lin. Calamin. Co.)

Compound Liniment of Calamine

	Metric	*Imperial*
Calamine	100 g.	2 oz.
Zinc Oxide	50 g.	1 oz.
Zinc Oleostearate	25 g.	½ oz.
Wool Fat	25 g.	½ oz.
White Soft Paraffin	200 g.	4 oz.
Liquid Paraffin	to 1000 ml.	to 20 fl. oz.

Triturate the calamine and zinc oxide to a smooth paste with a portion of the liquid paraffin. Melt together the zinc oleostearate, wool fat and soft paraffin at a low temperature and mix with more of the liquid paraffin; incorporate this mixture with the calamine and zinc oxide paste, and add sufficient liquid paraffin to produce the required volume.

LINIMENTUM CALCII HYDROXIDI
(Lin. Calc. Hydrox.)

Liniment of Calcium Hydroxide

Synonyms—Linimentum Calcis; Liniment of Lime.

	Metric	*Imperial*
Olive Oil	500 ml.	10 fl. oz.
Solution of Calcium Hydroxide ..	500 ml.	10 fl. oz.

Shake together.

LINIMENTUM CALCII HYDROXIDI CUM OLEO LINI
(Lin. Calc. Hydrox. c. Ol. Lini)

Liniment of Calcium Hydroxide with Linseed Oil

Synonyms—Lime Water and Oil; Carron Oil; Linimentum Calcis cum Oleo Lini.

	Metric	*Imperial*
Linseed Oil	500 ml.	10 fl. oz.
Solution of Calcium Hydroxide	500 ml.	10 fl. oz.

Shake together.

LINIMENTUM CAPSICI
(Lin. Capsic.)

Liniment of Capsicum

	Metric	*Imperial*
Stronger Tincture of Capsicum	350·0 ml.	7 fl. oz.
Oleic Acid	125·0 ml.	2½ fl. oz.
Oil of Lavender	6·2 ml.	60 m.
Alcohol (90 per cent.)	to 1000·0 ml.	to 20 fl. oz.

Mix the stronger tincture of capsicum with 500 millilitres (10 fluid ounces) of the alcohol, add the oleic acid, the oil of lavender, and sufficient of the alcohol to produce the required volume.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, and the stronger tincture of capsicum may be replaced by stronger tincture of capsicum prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LINIMENTUM CHLOROFORMI
(Lin. Chlorof.)

Liniment of Chloroform

	Metric	*Imperial*
Chloroform	500 ml.	10 fl. oz.
Liniment of Camphor	500 ml.	10 fl. oz.

Mix.

LINIMENTUM CROTONIS
(Lin. Croton.)

Liniment of Croton Oil

	Metric	*Imperial*
Croton Oil	120 ml.	3 fl. oz.
Oil of Cajuput	440 ml.	11 fl. oz.
Alcohol (90 per cent.)	440 ml.	11 fl. oz.

Mix.

In making this liniment the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LINIMENTUM HYDRARGYRI

(Lin. Hydrarg.)

Liniment of Mercury

	Metric	*Imperial*
Ointment of Mercury	300 g.	5 oz.
Dilute Solution of Ammonia ..	240 ml.	4 fl. oz.
Liniment of Camphor	480 ml.	8 fl. oz.

Shake the dilute solution of ammonia with the liniment of camphor and triturate the ointment of mercury with the mixture.

LINIMENTUM METHYLIS SALICYLATIS

(Lin. Methyl. Salicyl.)

Liniment of Methyl Salicylate

Synonyms—Linimentum Betulæ Compositum; Compound Liniment of Birch.

	Metric	*Imperial*
Menthol	50 g.	1 oz.
Oil of Eucalyptus	100 ml.	2 fl. oz.
Rectified Oil of Camphor ..	250 ml.	5 fl. oz.
Methyl Salicylate	to 1000 ml.	to 20 fl. oz.

Dissolve the menthol in the oil of eucalyptus, rectified oil of camphor and about 500 millilitres (10 fluid ounces) of the methyl salicylate, and add sufficient methyl salicylate to produce the required volume.

LINIMENTUM METHYLIS SALICYLATIS COMPOSITUM

(Lin. Methyl. Salicyl. Co.)

Compound Liniment of Methyl Salicylate

	Metric	*Imperial*
Menthol	50·0 g.	1 oz.
Chloral Hydrate	50·0 g.	1 oz.
Chlorophyll	0·5 g.	4½ gr.
Rectified Oil of Camphor ..	250·0 ml.	5 fl. oz.
Methyl Salicylate	to 1000·0 ml.	to 20 fl. oz.

Dissolve the menthol, chloral hydrate and chlorophyll in the rectified oil of camphor and about 500 millilitres (10 fluid ounces) of the methyl salicylate, and add sufficient methyl salicylate to produce the required volume.

LINIMENTUM METHYLIS SALICYLATIS OLEOSUM

(Lin. Methyl. Salicyl. Oleos.)

Liniment of Methyl Salicylate with Oil

Synonym—Linimentum Methylis Salicylatis Simplex.

	Metric	*Imperial*
Methyl Salicylate	250 ml.	5 fl. oz.
Rape Oil	to 1000 ml.	to 20 fl. oz.

Mix.

LINIMENTUM OPII

(Lin. Opii)

Liniment of Opium

	Metric	*Imperial*
Tincture of Opium	500 ml.	10 fl. oz.
Liniment of Soap	500 ml.	10 fl. oz.

Mix, set aside for a few days, and filter.

In making this preparation the tincture of opium may be replaced by tincture of opium prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LINIMENTUM POTASSII IODIDI

(Lin. Pot. Iod.)

Liniment of Potassium Iodide

	Metric	*Imperial*
Soft Soap	135 g.	2 oz. 306¼ gr.
Potassium Iodide	100 g.	2 oz.
Glycerin	70 ml.	1 fl. oz. 192 m.
Oil of Lemon	10 ml.	96 m.
Alcohol (60 per cent.) ..	.. to 1000 ml.	to 20 fl. oz.

Mix the glycerin with 600 millilitres (12 fluid ounces) of the alcohol, dissolve the soap in the mixture, add the oil of lemon and the potassium iodide, previously powdered, and shake until solution is effected, then add sufficient of the alcohol to produce the required volume. Allow to stand for a few hours, and decant or filter if necessary.

In making this liniment the alcohol (60 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LINIMENTUM POTASSII IODIDI CUM SAPONE

(Lin. Pot. Iod. c. Sap.)

Liniment of Potassium Iodide with Soap

	Metric	*Imperial*
Curd Soap, recently prepared and in shavings	160 g.	2 oz.
Potassium Iodide	120 g.	1½ oz.
Glycerin	80 ml.	1 fl. oz.
Oil of Lemon	8 ml.	48 m.
Distilled Water	800 ml.	10 fl. oz.

Mix the curd soap with the distilled water and the glycerin in a tared porcelain dish on a water-bath; when the soap is dissolved make up to the original weight with distilled water; pour the liquid into a mortar containing the potassium iodide, previously powdered, and mix briskly by trituration until the mixture is cold; set aside for one hour, add the oil of lemon, and again triturate the gelatinous product.

LINIMENTUM SAPONIS CAMPHORATUM

(Lin. Sap. Camph.)

Camphorated Soap Liniment

Synonym—Solid Opodeldoc.

	Metric	*Imperial*
Curd Soap, in shavings	80 g.	1 oz.
Camphor, in flowers	20 g.	¼ oz.
Oil of Thyme	4 g.	22 gr.
Oil of Rosemary	6 g.	33 gr.
Dilute Solution of Ammonia ..	50 g.	273½ gr.
Alcohol (90 per cent.)	840 g.	10½ oz.

Dissolve the curd soap and camphor in the alcohol with the aid of gentle heat; filter while warm, add the oils and the dilute solution of ammonia, mix thoroughly, pour into suitable containers, and allow to solidify.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LINIMENTUM SINAPIS
(Lin. Sinap.)
Liniment of Mustard

	Metric	*Imperial*
Volatile Oil of Mustard	35 ml.	336 m.
Camphor	55 g.	481¼ gr.
Castor Oil	125 ml.	2½ fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Dissolve the camphor and the oils in sufficient of the alcohol to produce the required volume.

In making this liniment the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LINIMENTUM SUCCINI COMPOSITUM
(Lin. Succin. Co.)
Compound Liniment of Amber

	Metric	*Imperial*
Oil of Amber	250 ml.	5 fl. oz.
Oil of Clove	250 ml.	5 fl. oz.
Olive Oil	500 ml.	10 fl. oz.

Mix.

LIQUOR ACRIFLAVINÆ
(Liq. Acriflavin.)
Solution of Acriflavine

	Metric	*Imperial*
Acriflavine	1 g.	8¾ gr.
Physiological Solution of Sodium Chloride	to 1000 ml.	to 20 fl. oz.

Dissolve.

LIQUOR ÆTHYLIS NITRITIS
(Liq. Æthyl. Nitrit.)
Solution of Ethyl Nitrite

Solution of ethyl nitrite is a solution of ethyl nitrite in a mixture of ninety-five parts by volume of dehydrated alcohol with five parts by volume of glycerin. The ethyl nitrite may be obtained by the interaction of alcohol, sodium nitrite and dilute sulphuric acid, at a low temperature. It should be **stored** in small, well-closed bottles, protected from light and in a cool place.

Standard.—Solution of ethyl nitrite, determined by the method of the British Pharmacopœia for Spiritus Ætheris Nitrosi, contains not less than 2·0 per cent. and not more than 2·5 per cent. w/v of $C_2H_5O_2N$, corresponding to not less than 2·5 per cent. and not more than 3·0 per cent. w/w of ethyl nitrite. Specific gravity, 0·823 to 0·826.

Dose.– 1 to 4 millilitres ($\frac{1}{4}$ to 1 fluid drachm).

LIQUOR ALKALINUS
(Liq. Alk.)

Alkaline Solution

Synonyms—Collunarium Alkalinum; Alkaline Nasal Wash.

	Metric	*Imperial*
Sodium Bicarbonate	15 g.	131¼ gr.
Borax	15 g.	131¼ gr.
Phenol	5 g.	43¾ gr.
Sucrose	25 g.	½ oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve.

LIQUOR ALUMINII ACETATIS
(Liq. Alumin. Acet.)

Solution of Aluminium Acetate

Synonyms—Liquor Alumini Aceticus; Burow's Solution.

	Metric	*Imperial*
Aluminium Sulphate	225 g.	4½ oz.
Acetic Acid	250 ml.	5 fl. oz.
Calcium Carbonate	100 g.	2 oz.
Distilled Water	750 ml.	15 fl. oz.

Dissolve the aluminium sulphate in 600 millilitres (12 fluid ounces) of the distilled water, add the acetic acid, and then the calcium carbonate mixed with the remainder of the water. Allow to stand for twenty-four hours in a cool place, stirring occasionally, and filter.

LIQUOR AMMONIÆ ANISATUS
(Liq. Ammon. Anisat.)

Anisated Solution of Ammonia

Synonyms—Liquor Ammonii Anisatus; Spiritus Ammoniæ Anisatus.

	Metric	*Imperial*
Oil of Anise	33·3 ml.	320 m.
Dilute Solution of Ammonia ..	166·7 ml.	3 fl. oz. 160 m.
Alcohol (90 per cent.)	to 1000·0 ml.	to 20 fl. oz.

Dissolve the oil of anise in 800 millilitres (16 fluid ounces) of the alcohol, add the dilute solution of ammonia and sufficient of the alcohol to produce the required volume.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

LIQUOR AMMONIÆ AROMATICUS

(Liq. Ammon. Aromat.)

Aromatic Solution of Ammonia

	Metric	*Imperial*
Ammonium Carbonate	25·0 g.	½ oz.
Strong Solution of Ammonia ..	50·0 ml.	1 fl. oz.
Terpeneless Oil of Lemon ..	0·2 ml.	2 m.
Terpeneless Oil of Nutmeg ..	0·4 ml.	4 m.
Alcohol (90 per cent.)	37·5 ml.	360 m.
Distilled Water	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the ammonium carbonate in 800 millilitres (16 fluid ounces) of distilled water; add the terpeneless oils of lemon and nutmeg dissolved in the alcohol, the strong solution of ammonia and sufficient distilled water to produce the required volume. Add 25 grammes (½ ounce) of purified talc or kaolin, shake well and filter.

Standard.—Aromatic solution of ammonia, determined by the method of the British Pharmacopœia for Spiritus Ammoniæ Aromaticus, contains not less than 2·1 per cent. and not more than 2·4 per cent. w/v of NH_3, and not less than 1·265 per cent. and not more than 1·485 per cent. w/v of CO_2.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

LIQUOR AMMONII CITRATIS DILUTUS

(Liq. Ammon. Cit. Dil.)

Dilute Solution of Ammonium Citrate

Synonyms—Liquor Ammonii Citratis; Solution of Ammonium Citrate.

	Metric	*Imperial*
Strong Solution of Ammonium Citrate	250 ml.	5 fl. oz.
Distilled Water	.. to 1000 ml.	to 20 fl. oz.

Mix.

It should be **stored** in a bottle of lead-free glass.

Dose.– 8 to 24 millilitres (2 to 6 fluid drachms).

LIQUOR AMMONII CITRATIS FORTIS
(Liq. Ammon. Cit. Fort.)

Strong Solution of Ammonium Citrate

	Metric	*Imperial*
Citric Acid, in powder	500 g.	10 oz.
Strong Solution of Ammonia ..	a sufficient	quantity
Distilled Water	to 1000 ml.	to 20 fl. oz.

Add sufficient strong solution of ammonia gradually to the citric acid to produce a solution of which one drop of the resulting solution diluted with ten drops of distilled water gives a full blue colour with one drop of solution of bromo-thymol blue and a full yellow colour with one drop of solution of thymol blue, and add sufficient distilled water to produce the required volume.

It should be **stored** in a bottle of lead-free glass.

Standard.—Strong solution of ammonium citrate, determined by the method of the British Pharmacopœia for Liquor Ammonii Acetatis Fortis, contains not less than 55 per cent. and not more than 60 per cent. w/v of $C_6H_5O_7(NH_4)_3$; each millilitre of N/1 sodium hydroxide is equivalent to 0·08105 gramme of $C_6H_5O_7(NH_4)_3$. Specific gravity, about 1·209. The reaction of 1 millilitre, diluted with 10 millilitres of water, is not less than *p*H 7·0 and not more than *p*H 8·0.

Dose.– 2 to 6 millilitres (½ to 1½ fluid drachms).

LIQUOR ARSENI ACIDUS
(Liq. Arsen. Acid.)

Acid Solution of Arsenic

Synonym—Liquor Arsenici Hydrochloricus.

	Metric	*Imperial*
Arsenic Trioxide, in powder ..	10 g.	87½ gr.
Hydrochloric Acid	12 ml.	115 m.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the hydrochloric acid with 500 millilitres (10 fluid ounces) of distilled water and heat to boiling; add the arsenic trioxide and heat gently until dissolved; cool, and add sufficient distilled water to produce the required volume.

Standard.—Acid solution of arsenic, determined by the method of the British Pharmacopœia for Liquor Arsenicalis, employing a slight excess of sodium bicarbonate, contains not less than 0·95 per cent. and not more than 1·05 per cent. w/v of As_2O_3.

Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

LIQUOR ARSENI ALKALINUS

(Liq. Arsen. Alk.)

Alkaline Solution of Arsenic

	Metric	*Imperial*
Arsenic Trioxide, in powder ..	10 g.	87½ gr.
Potassium Carbonate	10 g.	87½ gr.
Compound Tincture of Lavender	30 ml.	288 m.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the arsenic trioxide and the potassium carbonate in 100 millilitres (2 fluid ounces) of distilled water with the aid of heat; cool, add the compound tincture of lavender and sufficient distilled water to produce the required volume.

Standard.—Alkaline solution of arsenic, determined after neutralisation with hydrochloric acid by the method of the British Pharmacopœia for Liquor Arsenicalis, contains not less than 0·95 per cent. and not more than 1·05 per cent. w/v of As_2O_3.

Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

LIQUOR ATROPINÆ SULPHATIS

(Liq. Atrop. Sulph.)

Solution of Atropine Sulphate

	Metric	*Imperial*
Atropine Sulphate	10 g.	87½ gr.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve.

It should be freshly prepared.

Dose.– 0·03 to 0·06 millilitre (½ to 1 minim).

LIQUOR AURI ET ARSENI BROMINATUS

(Liq. Aur. et Arsen. Brominat.)

Brominated Solution of Gold and Arsenic

Synonyms—Liquor Auri et Arsenii Bromidi; Liquor Auri Bromidi Arsenatus.

	Metric	*Imperial*
Arsenic Trioxide	4·6 g.	40 gr.
Potassium Carbonate	4·6 g.	40 gr.
Bromine	11·4 g.	100 gr.
Gold, in leaf, pure	1·5 g.	13 gr.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Add the arsenic trioxide and potassium carbonate to 200 millilitres (4 fluid ounces) of the distilled water in a flask, and boil until solution is complete; place the gold leaf in a wide-mouthed bottle, add 600 millilitres (12 fluid ounces) of distilled water, run in the bromine and shake until it is dissolved; add the solution of arsenic trioxide and shake for a

few seconds. Transfer the mixture to a flask and boil until bromine vapours are no longer given off; allow to cool, add sufficient distilled water to produce the required volume, and filter.

Dose.– 0·3 to 0 6 millilitre (5 to 10 minims).

LIQUOR AZORUBRI

(Liq. Azorub.)

Solution of Bordeaux B

Synonym—Liquor Ruber.

	Metric	*Imperial*
Bordeaux B	10 g.	87½ gr.
Glycerin	250 ml.	5 fl. oz.
Chloroform Water	to 1000 ml.	to 20 fl. oz.

Dissolve the bordeaux B in about 700 millilitres (14 fluid ounces) of the chloroform water, warming on a water-bath if necessary; cool, add the glycerin and sufficient chloroform water to produce the required volume; filter if necessary.

LIQUOR BISMUTHI ACIDUS

(Liq. Bism. Acid.)

Acid Solution of Bismuth

	Metric	*Imperial*
Bismuth Subnitrate ..	125·0 g.	2½ oz.
Tartaric Acid	a sufficient quantity	
Sodium Hydroxide ..	a sufficient quantity	
Chloroform	2·5 ml.	24 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Triturate the bismuth subnitrate with 98·2 grammes (1 ounce 420 grains) of tartaric acid and 150 millilitres (3 fluid ounces) of distilled water, continuing to stir until a thick paste is formed, and allow to stand until a small portion of the mixture is completely soluble in dilute solution of ammonia. Add gradually about 200 millilitres (4 fluid ounces) of a 0 375 per cent. w/v aqueous solution of tartaric acid, triturating constantly to produce a thin cream; add 800 millilitres of the same tartaric acid solution and allow to stand. Decant the clear liquid, repeat the washing by decantation, using four successive quantities each of about 1000 millilitres (20 fluid ounces) of the tartaric acid solution, collect and drain the precipitate. Mix the moist product with 30·82 grammes (269½ grains) of tartaric acid, allow to stand for one hour, dilute with 100 millilitres (2 fluid ounces) of distilled water, and add 175 millilitres (3½ fluid ounces) of a 20 per cent. w/v aqueous solution of sodium hydroxide. Carefully add, if necessary, a further quantity of sodium hydroxide in dilute aqueous solution until the liquid is neutral to bromocresol green or slightly acid to methyl red (*p*H 4·6), add the chloroform and sufficient distilled water to produce the required volume; shake until the chloroform is dissolved.

Standard.—Acid solution of bismuth contains the equivalent of not less than 9 per cent. and not more than 11 per cent. w/v of Bi_2O_3.

Assay.—Evaporate 5 millilitres to dryness, and ignite the residue at a dull red heat. Extract the residue with boiling water, dry the insoluble matter, add a few drops of nitric acid, ignite, and weigh the residue of Bi_2O_3.

Dose.– 1 to 2 millilitres ($\frac{1}{4}$ to $\frac{1}{2}$ fluid drachm).

LIQUOR BISMUTHI CONCENTRATUS

(Liq. Bism. Conc.)

Concentrated Solution of Bismuth

Concentrated solution of bismuth may be prepared by dissolving bismuth citrate in dilute solution of ammonia and diluting the solution with distilled water, or by the following process :—

	Metric	*Imperial*
Bismuth Subnitrate	140 g.	2 oz. 350 gr.
Citric Acid, in powder	104 g.	2 oz. 35 gr.
Dilute Solution of Ammonia ..	a sufficient quantity	
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the citric acid with the bismuth subnitrate and 4 millilitres (40 minims) of distilled water. Heat the mixture on a water-bath until a small portion is completely soluble in dilute solution of ammonia. Transfer the mixture to a filter and wash with distilled water until the washings give no reaction for nitrate. Add to the washed residue just sufficient dilute solution of ammonia to dissolve it, and then add sufficient distilled water to produce the required volume.

Standard.—Concentrated solution of bismuth, determined by the method described under Liquor Bismuthi et Ammonii Citratis, contains the equivalent of not less than 10 per cent. and not more than 12 per cent. w/v of Bi_2O_3.

Dose.– 1 to 2 millilitres ($\frac{1}{4}$ to $\frac{1}{2}$ fluid drachm).

LIQUOR BISMUTHI ET AMMONII CITRATIS

(Liq. Bism. et Ammon. Cit.)

Solution of Bismuth and Ammonium Citrate

Synonyms—Liquor Bismuthi; Liquor Bismuthi Citratis.

Solution of bismuth and ammonium citrate may be prepared by dissolving bismuth citrate in dilute solution of ammonia and diluting the solution with distilled water, or by the following process:—

	Metric	*Imperial*
Bismuth Subnitrate	70 g.	1 oz. 175 gr.
Citric Acid, in powder	52 g.	1 oz. 17½ gr.
Dilute Solution of Ammonia ..	a sufficient quantity	
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the citric acid with the bismuth subnitrate and 2 millilitres (20 minims) of distilled water. Heat the mixture on a water-bath until a small portion is completely soluble in dilute solution of ammonia. Transfer the mixture to a filter and wash with distilled water until the washings give no reaction for nitrate. Add to the washed residue just sufficient dilute solution of ammonia to dissolve it, and then add sufficient distilled water to produce the required volume.

Standard.—Solution of bismuth and ammonium citrate contains the equivalent of not less than 5 0 per cent. and not more than 6·0 per cent. w/v of Bi_2O_3.

Assay.—Evaporate 10 millilitres to dryness, ignite the residue at a dull red heat, re-ignite with a few drops of nitric acid, and weigh the residue of Bi_2O_3.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LIQUOR BORACIS COMPOSITUS

(Liq. Borac. Co.)

Compound Solution of Borax

Synonyms—Collunarium Acidi Carbolici Compositum; Dobell's Solution.

	Metric	*Imperial*
Borax	15 g.	131¼ gr.
Sodium Bicarbonate	15 g.	131¼ gr.
Phenol	3 g.	26¼ gr.
Glycerin	35 ml.	336 m.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the borax and sodium bicarbonate in about 500 millilitres (10 fluid ounces) of the water; add the glycerin, phenol, and sufficient distilled water to produce the required volume, and filter.

LIQUOR BROMIDI COMPOSITUS

(Liq. Brom. Co.)

Compound Bromide Solution

Synonym—Liquor Bromochloral Compositus.

	Metric	*Imperial*
Chloral Hydrate	275 0 g.	5½ oz.
Potassium Bromide	275 0 g.	5½ oz.
Extract of Cannabis	2·3 g.	20 gr.
Liquid Extract of Hyoscyamus	13·8 ml.	132½ m.
Tincture of Orange	125·0 ml.	2½ fl. oz.
Glycerin	187·5 ml.	3¾ fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Triturate the chloral hydrate with the extract of cannabis, dissolve the mixture in the tincture of orange, and add the liquid extract of hyoscyamus; dissolve the potassium bromide in the glycerin diluted with sufficient distilled water to produce a volume of 750 millilitres (15 fluid ounces), and add it to the first solution; add sufficient distilled water to produce the required volume, set aside for twenty-four hours, and filter.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

LIQUOR CALCII HYDROXIDI SACCHARATUS

(Liq. Calc. Hydrox. Sacch.)

Saccharated Solution of Calcium Hydroxide

Synonyms—Liquor Calcis Saccharatus; Saccharated Solution of Lime.

	Metric	*Imperial*
Calcium Hydroxide	50 g.	1 oz.
Sucrose	100 g.	2 oz.
Distilled Water	1000 ml.	20 fl. oz.

Mix the calcium hydroxide with a solution of the sucrose in the distilled water. Set aside in a stoppered, green glass bottle for a few hours, shaking occasionally; separate the clear solution by means of a siphon, avoiding unnecessary exposure to air.

Standard.—Saccharated solution of calcium hydroxide contains the equivalent of not less than 2·4 per cent. w/v of $Ca(OH)_2$. Specific gravity, about 1·055. Lead limit, 2 parts per million.

Assay.—Titrate 20 millilitres with N/1 hydrochloric acid, using methyl orange as indicator; each millilitre of N/1 hydrochloric acid is equivalent to 0·03705 gramme of $Ca(OH)_2$.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

LIQUOR CALCII LACTATIS

(Liq. Calc. Lact.)

Solution of Calcium Lactate

	Metric	*Imperial*
Calcium Carbonate	16 g.	140 gr.
Lactic Acid	35 ml.	336 m.
Chloroform Water ..	.. to 1000 ml.	to 20 fl. oz.

Mix the lactic acid with 900 millilitres (18 fluid ounces) of the chloroform water, gradually add the calcium carbonate, stirring to promote effervescence, and finally add sufficient chloroform water to produce the required volume.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

LIQUOR CALCIS CHLORINATÆ

(Liq. Calc. Chlorinat.)

Solution of Chlorinated Lime

	Metric	*Imperial*
Chlorinated Lime	100 g.	2 oz.
Distilled Water	1000 ml.	20 fl. oz.

Mix, transfer the mixture to a stoppered bottle, set aside for three hours, shaking occasionally, and filter through calico.

It should be **stored** in a stoppered bottle in a cool dark place and protected from light.

Standard.—Solution of chlorinated lime, determined by the method for Liquor Sodæ Chlorinatæ, yields not less than 2 per cent. w/v of available chlorine.

LIQUOR CALCIS CHLORINATÆ CUM ACIDO BORICO

(Liq. Calc. Chlorinat. c. Acid. Boric.)

Solution of Chlorinated Lime with Boric Acid

Synonym—Eusol.

	Metric	*Imperial*
Chlorinated Lime	12·5 g.	¼ oz.
Boric Acid, in powder	12·5 g.	¼ oz.
Distilled Water	..to 1000·0 ml.	to 20 fl. oz.

Reduce the chlorinated lime to fine powder, triturate it with the water to form a paste, and add the remainder of the water. Add the boric acid, shake well, allow to stand several hours, and filter.

It should be **stored** in well-closed containers in a cool place and protected from light, and should not be used when more than three weeks old.

LIQUOR CALCIS SULPHURATÆ

(Liq. Calc. Sulphurat.)

Solution of Sulphurated Lime

Synonyms—Lotio Calcis Sulphuratæ; Vleminckx's Solution.

	Metric	*Imperial*
Calcium Oxide	25 g.	½ oz.
Sublimed Sulphur	50 g.	1 oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Slake the calcium oxide with an equal quantity of distilled water, add the sulphur and 500 millilitres (10 fluid ounces) of the water, and boil in a flask until the sulphur is dissolved. Allow the liquid to cool,

filter, and pass sufficient distilled water through the filter to produce the required volume.

It should be **stored** in completely-filled, well-closed containers.

Standard.—Solution of sulphurated lime contains not less than 4 per cent. and not more than 5 per cent. w/v of total sulphur.

Assay.—Boil 2 millilitres with 10 millilitres of water and 5 millilitres of sodium hydroxide solution, and add slowly, rotating the flask, bromine solution As T until bromine is in excess. Acidify with hydrochloric acid, boil off the bromine, and add a slight excess of barium chloride. Heat for thirty minutes on a water-bath, filter, wash the precipitate, dry and weigh; each gramme of $BaSO_4$ is equivalent to 0·1373 gramme of sulphur.

LIQUOR CANTHARIDINI
(Liq. Cantharidin.)

Solution of Cantharidin

Synonyms—Tinctura Cantharidini; Tincture of Cantharidin.

	Metric	*Imperial*
Cantharidin	0·1 g.	$\frac{7}{8}$ gr.
Chloroform	10·0 ml.	96 m.
Alcohol (90 per cent.)	to 1000·0 ml.	to 20 fl. oz.

Dissolve the cantharidin in the chloroform, and add sufficient alcohol (90 per cent.) to produce the required volume.

Dose.– 0·12 to 0·3 millilitre (2 to 5 minims).

LIQUOR CARMINI
(Liq. Carmin.)

Solution of Carmine

	Metric	*Imperial*
Carmine	60 g.	1 oz. 87½ gr.
Dilute Solution of Ammonia ..	150 ml.	3 fl. oz.
Potassium Citrate	100 ml.	2 oz.
Glycerin	350 ml.	7 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Triturate the carmine with the dilute solution of ammonia, add the glycerin, and heat on a water-bath for five minutes or until the carmine is dissolved; cool, dissolve the potassium citrate in the mixture, and add sufficient distilled water to produce the required volume. Filter if necessary.

LIQUOR CAULOPHYLLI ET PULSATILLÆ
(Liq. Cauloph. et Pulsat.)
Solution of Caulophyllum and Pulsatilla

	Metric	*Imperial*
Liquid Extract of Caulophyllum	250 ml.	5 fl. oz.
Liquid Extract of Pulsatilla ..	50 ml.	1 fl. oz.
Glycerin	150 ml.	3 fl. oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

LIQUOR CAULOPHYLLI ET PULSATILLÆ COMPOSITUS
(Liq. Cauloph. et Pulsat. Co.)
Compound Solution of Caulophyllum and Pulsatilla

	Metric	*Imperial*
Liquid Extract of Caulophyllum	150 ml.	3 fl. oz.
Liquid Extract of Pulsatilla ..	50 ml.	1 fl. oz.
Liquid Extract of Aletris ..	100 ml.	2 fl. oz.
Liquid Extract of Black Haw ..	200 ml.	4 fl. oz.
Glycerin	200 ml.	4 fl. oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix, allow to stand for twenty-four hours, and filter.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

LIQUOR CHLORI
(Liq. Chlori)
Solution of Chlorine

Synonym—Aqua Chlori.

Solution of chlorine may be prepared by passing washed chlorine gas, obtained by the evaporation of liquid chlorine or by dropping concentrated hydrochloric acid on solid potassium permanganate, into distilled water until the solution contains somewhat more than 0·5 per cent. w/v of chlorine. Solution of chlorine may also be obtained by the following process :—Heat gently 32·5 grammes (284 grains) of granular manganese dioxide with 200 millilitres (4 fluid ounces) of hydrochloric acid and 65 millilitres (1 fluid ounce 144 minims) of distilled water and pass the resulting gas through a wash-bottle containing 50 millilitres (1 fluid ounce) of distilled water into a receiver containing 1000 millilitres (20 fluid ounces) of distilled water; when gas ceases to be evolved, shake the receiver until the chlorine is absorbed.

It should be **stored** in well-closed containers, protected from light.

LIQUOR CHROMII TRIOXIDI
(Liq. Chrom. Triox.)

Solution of Chromium Trioxide

Synonym—Liquor Acidi Chromici.

	Metric	*Imperial*
Chromium Trioxide	250 g.	5 oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve.

LIQUOR COCCI
(Liq. Cocc.)

Solution of Cochineal

Synonym—Liquid Cochineal.

	Metric	*Imperial*
Cochineal	100 g.	2 oz.
Potassium Carbonate	10 g.	87½ gr.
Potassium Citrate	100 g.	2 oz.
Alcohol (90 per cent.)	200 ml.	4 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the potassium carbonate in 600 millilitres (12 fluid ounces) of the distilled water and digest the cochineal in the solution on a water-bath for about two hours, replacing the water lost by evaporation; then strain through muslin, cool, add the alcohol and potassium citrate, and sufficient distilled water to produce the required volume.

LIQUOR COPAIBÆ
(Liq. Copaib.)

Solution of Copaiba

Synonym—Soluble Copaiba.

	Metric	*Imperial*
Copaiba	500 ml.	10 fl. oz.
Solution of Potassium Hydroxide	800 ml.	16 fl. oz.
Distilled Water to	1000 ml.	to 20 fl. oz.

Add the copaiba to 750 millilitres (15 fluid ounces) of the solution of potassium hydroxide, boil for one hour, add 250 millilitres (5 fluid ounces) of the water, mix thoroughly, and allow to cool; separate the clear liquid from the oil and sediment, evaporate to 950 millilitres (19 fluid ounces), add the remainder of the solution of potassium hydroxide, and filter through purified talc or kaolin.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

LIQUOR COPAIBÆ, BUCHU ET CUBEBÆ
(Liq. Copaib. Buchu et Cubeb.)

Solution of Copaiba, Buchu and Cubeb

	Metric	*Imperial*
Solution of Copaiba	800 ml.	16 fl. oz.
Liquid Extract of Buchu ..	100 ml.	2 fl. oz.
Liquid Extract of Cubeb ..	100 ml.	2 fl. oz.

Mix and filter through purified talc or kaolin.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

LIQUOR COPAIBÆ, BUCHU ET CUBEBÆ CUM OLEO SANTALI
(Liq. Copaib. Buchu et Cubeb. c. Ol. Santal.)

Solution of Copaiba, Buchu and Cubeb with Sandal Wood Oil

	Metric	*Imperial*
Solution of Copaiba, Buchu and Cubeb	800 ml.	16 fl. oz.
Oil of Sandal Wood	100 ml.	2 fl. oz.
Oil of Cassia	5 ml.	48 m.
Alcohol (90 per cent.)	95 ml.	1 fl. oz. 432 m.

Mix the oil of sandal wood and the oil of cassia with the alcohol, add the solution of copaiba, buchu and cubeb, and filter through purified talc or kaolin.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

LIQUOR COPAIBÆ ET OLEI SANTALI
(Liq. Copaib. et Ol. Santal.)

Solution of Copaiba and Sandal Wood Oil

	Metric	*Imperial*
Solution of Copaiba	800 ml.	16 fl. oz.
Oil of Sandal Wood	100 ml.	2 fl. oz.
Oil of Cassia	5 ml.	48 m.
Alcohol (90 per cent.)	95 ml.	1 fl. oz. 432 m.

Mix the oils of sandal wood and cassia with the alcohol, add the solution of copaiba, and filter through purified talc or kaolin.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

LIQUOR DEXTROSI ET SODII CHLORIDI

(Liq. Dextros. et Sod. Chlorid.)

Dextrose and Sodium Chloride Solution

Synonym—Glucose-saline Solution.

	Metric	*Imperial*
Dextrose	50 g.	1 oz.
Sodium Chloride	9 g.	78¾ gr.
Sterilised Water	to 1000 ml.	to 20 fl. oz.

Dissolve, and sterilise by heating in an autoclave, by tyndallisation or by filtration.

When required for intravenous injection, it should be prepared with sterilised water for intravenous injections.

LIQUOR EUONYMINI ET IRIDINI

(Liq. Euonym. et Iridin.)

Solution of Euonymin and Iridin

	Metric	*Imperial*
Extract of Euonymus	36·6 g.	320 gr.
Extract of Iris	18·3 g.	160 gr.
Potassium Carbonate	13·7 g.	120 gr.
Distilled Water	250·0 ml.	5 fl. oz.
Alcohol (45 per cent.)	to 1000·0 ml.	to 20 fl. oz.

Triturate the extracts with 500 millilitres (10 fluid ounces) of the alcohol in a mortar, and filter; to the filtrate add the potassium carbonate previously dissolved in the distilled water, and pass sufficient of the alcohol through the filter to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LIQUOR EUONYMINI ET PEPSINI

(Liq. Euonym. et Pepsin.)

Solution of Euonymin and Pepsin

	Metric	*Imperial*
Extract of Euonymus	18·3 g.	160 gr.
Pepsin	36·6 g.	320 gr.
Dilute Hydrochloric Acid ..	36·5 ml.	350 m.
Alcohol (45 per cent.)	300·0 ml.	6 fl. oz.
Chloroform Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the pepsin in the dilute hydrochloric acid mixed with 500 millilitres (10 fluid ounces) of the chloroform water; triturate the extract of euonymus with the alcohol, filter into the pepsin solution and pass sufficient of the chloroform water through the filter to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LIQUOR FERRI DIALYSATI
(Liq. Ferr. Dialysat.)
Solution of Dialysed Iron

	Metric	*Imperial*
Strong Solution of Ferric Chloride	700 ml.	7 fl. oz.
Dilute Solution of Ammonia ..	a sufficient quantity	
Distilled Water	a sufficient quantity	

Mix 600 millilitres (6 fluid ounces) of the strong solution of ferric chloride with 4000 millilitres (40 fluid ounces) of distilled water and stir into the mixture sufficient dilute solution of ammonia to impart, after thorough agitation, a distinct ammoniacal odour. Filter through calico, wash the precipitated ferric hydroxide with distilled water and press it to remove superfluous moisture. Add the precipitate to the remainder of the strong solution of ferric chloride, stir thoroughly, warm gently and, when complete or nearly complete solution is obtained, filter if necessary; place the liquid in a covered dialyser and subject it to a stream of water in the usual manner until the solution in the dialyser is almost tasteless. Adjust the resulting solution to measure 2800 millilitres (28 fluid ounces).

Standard.—Solution of dialysed iron contains not less than 3 per cent. and not more than 4 per cent. w/v of Fe. Specific gravity, about 1·049.

Assay.—Dilute about 5 grammes, accurately weighed, with 20 millilitres of water, add 3 millilitres of hydrochloric acid, boil for fifteen seconds, cool, dissolve 3 grammes of potassium iodide in the cold solution and, without further dilution, titrate the liberated iodine with N/10 sodium thiosulphate; each millilitre of N/10 sodium thiosulphate is equivalent to 0·005584 gramme of Fe. From the specific gravity of the solution calculate the percentage w/v.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

LIQUOR FERRI HYPOPHOSPHITIS
(Liq. Ferr. Hypophosph.)
Solution of Iron Hypophosphite

Synonym—Liquor Ferri Hypophosphitis Fortis; Strong Solution of Iron Hypophosphite.

	Metric	*Imperial*
Solution of Ferric Sulphate ..	142 ml.	2 fl. oz. 403 m.
Dilute Solution of Ammonia ..	230 ml.	4 fl. oz. 288 m.
Citric Acid	76 g.	1 oz. 227½ gr.
Sodium Hypophosphite ..	96 g.	1 oz. 402½ gr.
Sodium Citrate	66 g.	1 oz. 140 gr.
Distilled Water	a sufficient quantity	
Double Chloroform Water ..	to 1000 ml.	to 20 fl. oz.

Mix the dilute solution of ammonia with an equal volume of distilled water, gradually add the solution of ferric sulphate previously diluted with an equal volume of water, wash the precipitated ferric hydroxide by decantation with distilled water until free from sulphates, collect on a calico filter, drain, and transfer the moist precipitate to a porcelain dish; add the citric acid and 200 millilitres (4 fluid ounces) of distilled water, and heat on a water-bath, with occasional stirring, until a clear solution results; then add the sodium hypophosphite, continue the heating on the water-bath with stirring for about one minute or until a clear greenish solution is obtained; add the sodium citrate, filter, and pass sufficient double chloroform water through the filter to produce the required volume.

Standard.—Solution of iron hypophosphite contains not less than 8·5 per cent. and not more than 10·5 per cent. w/v of $Fe(H_2PO_2)_3$.

Assay.—Dilute 5 millilitres with water to 100 millilitres, transfer 10 millilitres to a stoppered bottle and proceed as described under Ferri Hypophosphis.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

LIQUOR FERRI IODIDI
(Liq. Ferr. Iod.)
Solution of Ferrous Iodide

	Metric	*Imperial*
Iron	150 g.	3 oz.
Iodine	464 g.	9 oz. 122½ gr.
Dilute Hypophosphorous Acid ..	80 ml.	1 fl. oz. 288 m.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Place the iron and the iodine in a flask having a capacity of at least 4000 millilitres (80 fluid ounces) with 800 millilitres (16 fluid ounces) of the distilled water and allow the reaction to proceed until the liquid loses its brown colour. Heat the solution to boiling-point, cool, filter through starch-free filter paper into the dilute hypophosphorous acid, and pass sufficient previously boiled and cooled distilled water through the filter to produce the required volume.

It should be **stored** in small, completely-filled, well-closed bottles and exposed to the light.

Standard.—Solution of ferrous iodide contains not less than 53·1 per cent. and not more than 54·2 per cent. w/v of FeI_2. Specific gravity, about 1·45.

Assay.—Dilute about 0·7 gramme, accurately weighed, with 50 millilitres of water and proceed by the method of the British Pharmacopœia for Syrupus Ferri Iodidi. From the specific gravity, calculate the percentage w/v.

Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

Solution of ferrous iodide when diluted with seven times its volume of syrup forms Syrupus Ferri Iodidi.

LIQUOR FERRI OXYCHLORIDI

(Liq. Ferr. Oxychlor.)

Solution of Ferric Oxychloride

Synonyms—Soluble Peroxide of Iron; Solution of Chloroxide of Iron; Solution of Basic Ferric Chloride.

	Metric	*Imperial*
Strong Solution of Ferric Chloride	225·0 g.	4½ oz.
Dilute Solution of Ammonia ..	350·0 g.	7 oz.
Hydrochloric Acid	23·5 g.	206 gr.
Distilled Water	to 1000·0 g.	to 20 oz.

Mix the dilute solution of ammonia with 3200 millilitres (64 fluid ounces) of distilled water, and add slowly, with constant stirring, the strong solution of ferric chloride previously diluted with 1600 millilitres (32 fluid ounces) of distilled water. Filter through calico, wash the precipitated ferric hydroxide with distilled water and press it to remove superfluous moisture. Mix the hydrochloric acid with the precipitate, stir the mixture at intervals during three days, then heat if necessary to about 40° to complete the solution, and add sufficient distilled water to produce the required weight.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

LIQUOR FERRI PEPTONATIS

(Liq. Ferr. Pepton.)

Solution of Iron Peptonate

Synonym—Solution of Peptonised Iron.

	Metric	*Imperial*
Peptone	40 g.	350 gr.
Solution of Ferric Oxychloride	200 ml.	4 fl. oz.
Solution of Potassium Hydroxide	a sufficient quantity	
Alcohol (90 per cent.)	125 ml.	2½ fl. oz.
Aromatic Elixir	400 ml.	8 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the peptone in 2000 millilitres (40 fluid ounces) of distilled water, add the solution of ferric oxychloride, previously diluted with 2000 millilitres (40 fluid ounces) of distilled water, and neutralise to litmus paper by adding a sufficient quantity of solution of potassium hydroxide. Rapidly wash the flocculent precipitate with distilled water by decantation until the washings give not more than a faint opalescence with solution of silver nitrate, drain the precipitate, transfer to a porcelain dish, add 80 millilitres (1 fluid ounce 288 minims) of solution of

potassium hydroxide, stir, and while stirring add distilled water, not exceeding 75 millilitres (1½ fluid ounces), to dissolve the precipitate. Finally add the alcohol and aromatic elixir, previously mixed, and sufficient distilled water to produce the required volume.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

LIQUOR FERRI PEPTONATIS CUM MANGANO

(Liq. Ferr. Pepton. c. Mang.)

Solution of Iron Peptonate with Manganese

Synonym—Solution of Peptonised Iron with Manganese.

	Metric	*Imperial*
Manganese Chloride	3·4 g.	30 gr.
Solution of Iron Peptonate	to 1000·0 ml.	to 20 fl. oz.

Dissolve.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

LIQUOR FERRI PERCHLORIDI FORTIS

(Liq. Ferr. Perchlor. Fort.)

Strong Solution of Ferric Chloride

Strong solution of ferric chloride may be prepared by the following process:—

	Metric	*Imperial*
Iron	210 g.	7 oz.
Hydrochloric Acid	1230 ml.	41 fl. oz.
Nitric Acid	90 ml.	3 fl. oz.
Distilled Water	a sufficient quantity	

Place the iron in a flask, add a mixture of 750 millilitres (25 fluid ounces) of hydrochloric acid and 420 millilitres (14 fluid ounces) of distilled water, and heat at a moderate temperature until effervescence ceases; then boil, filter from undissolved iron, rinse the flask and contents with a little distilled water and pour the rinsings over the filter. Add to the filtrate 420 millilitres (14 fluid ounces) of hydrochloric acid, mix, and pour the solution in a slow continuous stream into the nitric acid, chemical action being promoted, if necessary, by gently warming. Evaporate the product until a precipitate begins to form, add 60 millilitres (2 fluid ounces) of hydrochloric acid, and sufficient distilled water to produce 1050 millilitres (35 fluid ounces) or to make the resulting solution correspond to the following tests.

Standard.—Strong solution of ferric chloride contains not less than 58·5 per cent. and not more than 61·5 per cent. w/v of $FeCl_3$. When diluted with three times its volume of water, it yields a solution which complies with the tests for purity of the British Pharmacopœia for Liquor Ferri Perchloridi. Specific gravity, about 1·43. Lead limit, 50 parts per million.

Assay.—Dilute about 0·7 gramme, accurately weighed, with 50 millilitres of water and proceed by the method of the British Pharmacopœia for Liquor Ferri Perchloridi. From the specific gravity, calculate the percentage w/v.

LIQUOR FERRI PERSULPHATIS

(Liq. Ferr. Persulph.)

Solution of Ferric Sulphate

	Metric	*Imperial*
Ferrous Sulphate..	800 g.	16 oz.
Sulphuric Acid	75 ml.	1½ fl. oz.
Nitric Acid..	75 ml.	1½ fl. oz.
Distilled Water	to 1100 ml.	to 22 fl. oz.

Add the sulphuric acid to 1000 millilitres (20 fluid ounces) of the distilled water and dissolve the ferrous sulphate in the mixture with the aid of heat. Mix the nitric acid with 200 millilitres (4 fluid ounces) of the distilled water and add to this diluted acid, warmed, the solution of ferrous sulphate; concentrate by boiling until, on the sudden disengagement of ruddy vapours, the liquid ceases to be black and acquires a red colour. If any ferrous salt remains in solution, add a few drops of nitric acid and boil again. When the solution is cold add, if necessary, sufficient distilled water to produce the required volume.

Standard.—Solution of ferric sulphate contains not less than 14 per cent. and not more than 15 per cent. w/v of Fe. Specific gravity, about 1·44. Arsenic limit, 5 parts per million. 1 millilitre diluted with water yields no blue colouration on the addition of potassium ferricyanide solution (absence of ferrous salts).

Assay.—Dilute about 1·5 grammes, accurately weighed, with 25 millilitres of water, add 7 millilitres of hydrochloric acid, dissolve 3·5 grammes of potassium iodide in the solution and, without further dilution, titrate the liberated iodine with N/10 sodium thiosulphate; each millilitre of N/10 sodium thiosulphate is equivalent to 0·005584 gramme of Fe. From the specific gravity, calculate the percentage w/v.

LIQUOR FERRI PHOSPHATIS

(Liq. Ferr. Phosph.)

Solution of Ferrous Phosphate

	Metric	*Imperial*
Iron	68·8 g.	1 oz. 164½ gr.
Phosphoric Acid	320·0 ml.	6 fl. oz. 192 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Place the iron and the phosphoric acid, previously diluted with half its volume of water, in a flask, heat gently until the iron is dissolved, add sufficient distilled water to produce the required volume, and filter.

It should be **stored** in small, completely-filled, well-closed bottles.

Standard.—Solution of ferrous phosphate contains not less than 14·1 per cent. and not more than 14·7 per cent. w/v of iron, calculated as $Fe_3(PO_4)_2$.

Assay.—Dilute about 1 gramme, accurately weighed, with about 50 millilitres of water and proceed by the method of the British Pharmacopœia for iron in Syrupus Ferri Phosphatis Compositus. From the specific gravity, calculate the percentage w/v.

Dose.– 0·25 to 0·5 millilitre (4 to 8 minims).

LIQUOR FERRI PHOSPHATIS COMPOSITUS

(Liq. Ferr. Phosph. Co.)

Compound Solution of Ferrous Phosphate

	Metric	*Imperial*
Iron	17·2 g.	150½ gr.
Phosphoric Acid	192·0 ml.	3 fl. oz. 403 m.
Calcium Carbonate	54·4 g.	1 oz. 38½ gr.
Potassium Bicarbonate	4·0 g.	35 gr.
Sodium Phosphate	4·0 g.	35 gr.
Cochineal	14·0 g.	122½ gr.
Triple Orange-flower Water	200·0 ml.	4 fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dilute 80 millilitres (1 fluid ounce 288 minims) of the phosphoric acid with 100 millilitres (2 fluid ounces) of distilled water, add the iron and heat gently until dissolved; triturate the calcium carbonate, potassium bicarbonate and sodium phosphate with the remainder of the phosphoric acid and 320 millilitres (6 fluid ounces 192 minims) of distilled water and add the solution containing the iron. Boil the

cochineal with 175 millilitres (3½ fluid ounces) of distilled water for fifteen minutes, cool, strain, add the triple orange-flower water, filter into the resulting liquid the solution containing the iron, calcium, potassium and sodium compounds, and pass sufficient distilled water through the filter to produce the required volume.

It should be **stored** in completely-filled bottles.

Standard.—Compound solution of ferrous phosphate, determined by the methods of the British Pharmacopœia for iron and for calcium in Syrupus Ferri Phosphatis Compositus, using about 5 grammes accurately weighed, contains not less than 3·5 per cent. and not more than 3·7 per cent. w/v of iron, calculated as $Fe_3(PO_4)_2$, and not less than 5·4 per cent. and not more than 5·8 per cent. w/v of calcium, calculated as $Ca_3(PO_4)_2$.

Dose.– 0·5 to 2 millilitres (8 to 30 minims).

LIQUOR FORMALDEHYDI SAPONATUS

(Liq. Formaldehyd. Sap.)

Solution of Formaldehyde with Soap

	Metric	*Imperial*
Soft Soap	400 g.	8 oz.
Alcohol (90 per cent.)	300 ml.	6 fl. oz.
Solution of Formaldehyde ..	200 ml.	4 fl. oz.
Distilled Water	.. to 1000 ml.	to 20 fl. oz.

Dissolve the soft soap in the alcohol, add the solution of formaldehyde and sufficient distilled water to produce the required volume.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LIQUOR GUTTA PERCHA

(Liq. Gutt. Perch.)

Solution of Gutta Percha

Synonym—Traumaticin.

	Metric	*Imperial*
Gutta Percha, in thin slices ..	100 g.	2 oz.
Chloroform	900 g.	18 oz.

Add the gutta percha to the chloroform in a stoppered bottle and shake frequently, set aside until the insoluble matter has subsided, and decant the clear liquid.

It should be **stored** in well-stoppered bottles.

LIQUOR HAMAMELIDIS
(Liq. Hamam.)

Solution of Hamamelis

Synonym—Distilled Witch Hazel.

	Metric	*Imperial*
Fresh Hamamelis Leaf	1000 g.	20 oz.
Distilled Water	2000 ml.	40 fl. oz.
Alcohol (90 per cent.)	160 ml.	3 fl. oz. 96 m.

Macerate for twenty-four hours and then distil 1000 millilitres (20 fluid ounces).

LIQUOR HYDRARGYRI NITRATIS ACIDUS
(Liq. Hydrarg. Nit. Acid.)

Acid Solution of Mercuric Nitrate

	Metric	*Imperial*
Mercury	120 g.	4 oz.
Nitric Acid	150 ml.	5 fl. oz.
Distilled Water	45 ml.	1½ fl. oz.

Mix the nitric acid and the distilled water in a tared flask, and dissolve the mercury in the mixture without the application of heat; boil gently until the solution weighs 360 grammes (12 ounces).

It should be **stored** in well-stoppered bottles and protected from light.

LIQUOR IODI ÆTHEREUS
(Liq. Iod. Æther.)

Ethereal Solution of Iodine

Synonyms—Tinctura Iodi Ætherea; Ethereal Tincture of Iodine.

	Metric	*Imperial*
Iodine	25 g.	½ oz.
Ether	to 1000 ml.	to 20 fl. oz.

Reduce the iodine to powder, dissolve it in about 900 millilitres (18 fluid ounces) of the ether, and add sufficient ether to produce the required volume.

LIQUOR IODI AQUOSUS
(Liq. Iod. Aq.)
Aqueous Solution of Iodine

Synonym—Lugol's Solution.

	Metric	*Imperial*
Iodine	50 g.	1 oz.
Potassium Iodide	75 g.	1½ oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the iodine and potassium iodide in about 100 millilitres (2 fluid ounces) of the distilled water, and add sufficient distilled water to produce the required volume.

Dose.– 0·3 to 0·6 millilitres (5 to 10 minims).

LIQUOR IODI DECOLORATUS
(Liq. Iod. Decol.)
Decolourised Solution of Iodine

Synonyms—Tinctura Iodi Decolorata; Decolourised Tincture of Iodine.

	Metric	*Imperial*
Iodine	28·6 g.	250 gr.
Strong Solution of Ammonia	62·5 ml.	1¼ fl. oz.
Alcohol (90 per cent.)	to 1000·0 ml.	to 20 fl. oz.

Dissolve the iodine in 275 millilitres (5½ fluid ounces) of the alcohol by the aid of gentle heat and add the strong solution of ammonia; keep the mixture in a warm place until decolourised, then add sufficient of the alcohol to produce the required volume.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LIQUOR IODI OLEOSUS
(Liq. Iod. Oleos.)
Oily Solution of Iodine

Synonyms—Tinctura Iodi Oleosa; Oily Tincture of Iodine.

	Metric	*Imperial*
Iodine	80·0 g.	1 oz. 262½ gr.
Castor Oil	162·5 ml.	3¼ fl. oz.
Alcohol (90 per cent.)	to 1000·0 ml.	to 20 fl. oz.

Dissolve the iodine in 800 millilitres (16 fluid ounces) of the alcohol

by the aid of gentle heat; add the castor oil, and sufficient of the alcohol to produce the required volume.

In making this preparation the alcohol (90 per cent) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LIQUOR KERATINI
(Liq. Keratin.)
Solution of Keratin

	Metric	*Imperial*
Keratin	90 g.	1 oz. 350 gr.
Strong Solution of Ammonia ..	455 ml.	9 fl. oz. 48 m.
Alcohol (90 per cent.)	455 ml.	9 fl. oz. 48 m.

Dissolve the keratin in the mixed liquids, and filter if necessary.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LIQUOR MAGNESII CITRATIS
(Liq. Mag. Cit.)
Solution of Magnesium Citrate

Synonym—Limonade Purgative; Effervescing Solution of Magnesium and Potassium Citrates.

	Metric	*Imperial*
Heavy Magnesium Carbonate ..	40·0 g.	350 gr.
Citric Acid	90·0 g.	1 oz. 350 gr.
Syrup of Lemon	160·0 ml.	3 fl. oz. 96 m.
Potassium Bicarbonate, in crystals	7·5 g.	65½ gr.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the citric acid in 200 millilitres (4 fluid ounces) of the distilled water, add the magnesium carbonate, and stir until dissolved. Filter the solution into the syrup of lemon contained in a strong bottle capable of holding 1000 millilitres (20 fluid ounces), add sufficient distilled water nearly to fill the bottle, then introduce the potassium bicarbonate and immediately close the bottle with a cork, which should be secured with string or wire; shake the bottle until the bicarbonate is dissolved.

It should be freshly prepared.

Dose.– 100 to 300 millilitres (3 to 10 fluid ounces), or more.

LIQUOR MORPHINÆ ACETATIS

(Liq. Morph. Acet.)

Solution of Morphine Acetate

	Metric	*Imperial*
Morphine Acetate	10 g.	87½ gr.
Dilute Acetic Acid	20 ml.	192 m.
Alcohol (90 per cent.)	250 ml.	5 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the alcohol with an equal volume of the distilled water and add the dilute acetic acid; dissolve the morphine acetate in the mixture, and add sufficient distilled water to produce the required volume.

Dose.– 0·3 to 2 millilitres (5 to 30 minims).

LIQUOR MORPHINÆ TARTRATIS

(Liq. Morph. Tart.)

Solution of Morphine Tartrate

	Metric	*Imperial*
Morphine Tartrate	10 g.	87½ gr.
Alcohol (90 per cent.)	250 ml.	5 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the alcohol with an equal volume of distilled water, dissolve the morphine tartrate in the mixture, and add sufficient distilled water to produce the required volume.

Dose.– 0·3 to 2 millilitres (5 to 30 minims).

LIQUOR OPII SEDATIVUS

(Liq. Opii Sed.)

Sedative Solution of Opium

	Metric	*Imperial*
Opium, in small pieces	100·0 g.	2 oz.
Calcium Hydroxide	15·0 g.	131¼ gr.
Alcohol (90 per cent.)	200·0 ml.	4 fl. oz.
Sherry-type Wine	150·0 ml.	3 fl. oz.
Hydrochloric Acid	15·6 ml.	150 m.
Distilled Water	a sufficient quantity	
Alcohol (60 per cent.)	a sufficient quantity	

Macerate the opium with 250 millilitres (5 fluid ounces) of boiling water, allow to cool, add the calcium hydroxide, and digest in a closed vessel for two hours with frequent stirring. Strain, press, and repeat

the maceration with two further successive quantities each of 250 millilitres (5 fluid ounces) of cold distilled water. Mix the expressed liquids, add the above quantity of hydrochloric acid, or sufficient for 10 millilitres of the product to require for neutralisation to litmus paper 1 millilitre of N/1 solution of sodium hydroxide; add the alcohol (90 per cent.) and the sherry-type wine. Filter, determine the proportion of morphine in a portion of the product, and add to the remainder sufficient alcohol (60 per cent.) to produce a solution of the required strength.

Standard.—Sedative solution of opium, determined by the method of the British Pharmacopœia for Tinctura Opii, contains not less than 0·95 per cent. and not more than 1·05 per cent. w/v of morphine, calculated as anhydrous.

Dose.– 0·3 to 2 millilitres (5 to 30 minims).

LIQUOR PANCREATINI
(Liq. Pancreatin.)

Solution of Pancreatin

Synonyms—Liquor Pancreatis; Pancreatic Solution.

	Metric	*Imperial*
Glycerin of Pancreatin	165 ml.	3 fl. oz. 144 m.
Sodium Bicarbonate	35 g.	306½ gr.
Glycerin	50 ml.	1 fl. oz.
Alcohol (90 per cent.)	150 ml.	3 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the glycerin of pancreatin with the sodium bicarbonate, glycerin, alcohol and sufficient distilled water to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

LIQUOR PAPAINI ET IRIDINI
(Liq. Papain. et Iridin.)

Solution of Papain and Iridin

	Metric	*Imperial*
Papain	18·3 g.	160 gr.
Extract of Iris	18·3 g.	160 gr.
Glycerin	100·0 ml.	2 fl. oz.
Alcohol (90 per cent.)	50·0 ml.	1 fl. oz.
Chloroform Water ..	to 1000·0 ml.	to 20 fl. oz.

Macerate the papain and extract of iris with the glycerin, alcohol and 800 millilitres (16 fluid ounces) of the chloroform water for seven days, with frequent agitation; filter, and add sufficient chloroform water to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

LIQUOR PEPTICUS
(Liq. Pept.)
Peptic Solution

	Metric	*Imperial*
Stronger Glycerin of Pepsin ..	125 ml.	2½ fl. oz.
Dilute Hydrochloric Acid ..	25 ml.	½ fl. oz.
Alcohol (90 per cent.)	100 ml.	2 fl. oz.
Glycerin	25 ml.	½ fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the stronger glycerin of pepsin, dilute hydrochloric acid, alcohol and glycerin, and add sufficient distilled water to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

LIQUOR PHENOLIS ALKALINUS
(Liq. Phenol. Alk.)
Alkaline Solution of Phenol

Synonym—Solution of Sodium Phenate

	Metric	*Imperial*
Phenol	100 g.	2 oz.
Sodium Hydroxide	10 g.	87½ gr.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the sodium hydroxide in about 500 millilitres (10 fluid ounces) of the distilled water; dissolve the phenol in the solution and add sufficient distilled water to produce the required volume.

It should be **stored** in glass-stoppered bottles and protected from light.

For use as a mouthwash or gargle, this solution should be diluted with about 20 to 30 parts of water.

LIQUOR PHOSPHORI COMPOSITUS
(Liq. Phosphor. Co.)
Compound Solution of Phosphorus

Synonyms—Tinctura Phosphori Composita; Compound Tincture of Phosphorus.

	Metric	*Imperial*
Phosphorus	2 g.	17½ gr.
Chloroform	175 ml.	3½ fl. oz.
Dehydrated Alcohol ..	.. to 1000 ml.	to 20 fl. oz.

Place the phosphorus and chloroform in a stoppered bottle and heat gently on a water-bath until solution is effected; add sufficient dehydrated alcohol to produce the required volume and shake well.

It should be **stored** in well-stoppered bottles and protected from light.

Dose.– 0·2 to 0·8 millilitre (3 to 12 minims).

LIQUOR POTASSII ARSENATIS ET BROMIDI
(Liq. Pot. Arsen. et Brom.)

Solution of Potassium Arsenate and Bromide

Synonyms—Liquor Arsenii Bromidi; Clemens' Solution.

	Metric	*Imperial*
Arsenic Trioxide	10 g.	87½ gr.
Potassium Bicarbonate	10 g.	87½ gr.
Bromine	5 ml.	48 m.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Add the arsenic trioxide and potassium bicarbonate to 100 millilitres (2 fluid ounces) of distilled water and boil until dissolved; then add 700 millilitres (14 fluid ounces) of distilled water and the bromine, shake until dissolved, and add sufficient distilled water to produce the required volume.

Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

LIQUOR POTASSII PERMANGANATIS
(Liq. Pot. Permang.)

Solution of Potassium Permanganate

	Metric	*Imperial*
Potassium Permanganate	10 g.	87½ gr.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve.

Dose.– 8 to 16 millilitres (2 to 4 fluid drachms).

LIQUOR POTASSII PHENATIS COMPOSITUS
(Liq. Pot. Phenat. Co.)

Compound Solution of Potassium Phenate

Synonyms—Liquor Potassii Carbolatis Compositus; Compound Solution of Potassium Carbolate.

	Metric	*Imperial*
Liquefied Phenol	50·0 ml.	1 fl. oz.
Solution of Potassium Hydroxide	50·0 ml.	1 fl. oz.
Cologne Spirit	50·0 ml.	1 fl. oz.
Saccharin	0·1 g.	1 gr.
Tincture of Quillaia	25·0 ml.	½ fl. oz.
Emulsion of Chloroform	25·0 ml.	½ fl. oz.
Solution of Bordeaux B	4·2 ml.	40 m.
Triple Rose Water	to 1000·0 ml.	to 20 fl. oz.

Add the liquefied phenol to the solution of potassium hydroxide previously diluted with three times its volume of triple rose water,

dissolve the saccharin in the liquid, add the other ingredients and sufficient of the triple rose water to produce the required volume.

LIQUOR QUININÆ ET STRYCHNINÆ
(Liq. Quinin. et Strych.)
Solution of Quinine and Strychnine

	Metric	*Imperial*
Quinine Sulphate	118·4 g.	2 oz. 161 gr.
Strychnine Hydrochloride ..	2·4 g.	21 gr.
Hypophosphorous Acid	60·0 ml.	1 fl. oz. 96 m.
Glycerin	620·0 ml.	12 fl. oz. 192 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Triturate the quinine sulphate and the strychnine hydrochloride with a mixture of the glycerin and 225 millilitres (4½ fluid ounces) of distilled water; add the hypophosphorous acid, stir until the alkaloidal salts have dissolved, and add sufficient distilled water to produce the required volume.

It should be **stored** in completely-filled, well-closed bottles and protected from light.

Standard.—Solution of quinine and strychnine, determined by the methods of the British Pharmacopœia for quinine and for strychnine in Syrupus Ferri Phosphatis cum Quinina et Strychnina, using about 12·5 millilitres accurately weighed, contains not less than 8·5 per cent. and not more than 9·0 per cent. w/v of anhydrous quinine, and not less than 0·186 per cent. and not more than 0·206 per cent. w/v of strychnine.

A syrup differing from Syrupus Ferri Phosphatis cum Quinina et Strychnina only in the presence of 0·75 per cent. v/v of hypophosphorous acid may be made by mixing 1 fluid ounce of this solution, 1 fluid ounce of solution of ferrous phosphate, ½ fluid ounce of glycerin and 1 fluid ounce of distilled water with sufficient syrup to produce 8 fluid ounces.

LIQUOR RHEI DULCIS
(Liq. Rhei Dulc.)
Sweet Solution of Rhubarb

Synonyms—Elixir Rhei; Elixir of Rhubarb; Sweet Essence of Rhubarb.

	Metric	*Imperial*
Liquid Extract of Rhubarb ..	250·0 ml.	5 fl. oz.
Oil of Anise	0·5 ml.	5 m.
Syrup	225·0 ml.	4½ fl. oz.
Glycerin	150·0 ml.	3 fl. oz.
Alcohol (90 per cent.)	25·0 ml.	½ fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Mix the liquid extract of rhubarb, syrup, glycerin and about 300 millilitres (6 fluid ounces) of distilled water, add the oil of anise dissolved in the alcohol, and sufficient distilled water to produce the required volume; filter if necessary.

Dose.—4 to 12 millilitres (1 to 3 fluid drachms).

LIQUOR RINGER
(Liq. Ringer)

Ringer's Solution

	Metric	*Imperial*
Sodium Chloride	7·0 g.	61¼ gr.
Potassium Chloride	0·14 g.	1 9/100 gr.
Calcium Chloride	0·12 g.	1 1/200 gr.
Sodium Bicarbonate	0·2 g.	1¾ gr.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve. It may be sterilised by tyndallisation or by filtration.

This solution is isotonic with the serum of frogs' blood.

LIQUOR RINGER-LOCKE
(Liq. Ringer-Locke)

Ringer-Locke Solution

	Metric	*Imperial*
Sodium Chloride	9·0 g.	78¾ gr.
Potassium Chloride	0·42 g.	3 27/40 gr.
Calcium Chloride	0·24 g.	2 1/10 gr.
Dextrose	1·0 g.	8¾ gr.
Sodium Bicarbonate	0·5 g.	4⅜ gr.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve. It may be sterilised by tyndallisation or by filtration.

This solution is isotonic with the serum of mammalian blood.

LIQUOR RINGER-TYRODE
(Liq. Ringer-Tyrode)

Ringer-Tyrode Solution

	Metric	*Imperial*
Sodium Chloride	8·0 g.	70 gr.
Potassium Chloride	0·2 g.	1¾ gr.
Calcium Chloride	0·2 g.	1¾ gr.
Magnesium Chloride	0·01 g.	7/80 gr.
Dextrose	1·0 g.	8¾ gr.
Sodium Acid Phosphate ..	0·05 g.	7/16 gr.
Sodium Bicarbonate	1·0 g.	8¾ gr.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve. It may be sterilised by tyndallisation or by filtration.

This solution is isotonic with the serum of mammalian blood.

LIQUOR ROSÆ DULCIS

(Liq. Ros. Dulc.)

Sweet Solution of Rose

	Metric	*Imperial*
Cochineal, in coarse powder ..	40·0 g.	350 gr.
Potassium Carbonate	40·0 g.	350 gr.
Potash Alum	40·0 g.	350 gr.
Potassium Acid Tartrate ..	40·0 g.	350 gr.
Glycerin	750 0 ml.	15 fl. oz.
Oil of Rose	0·25 ml.	2½ m.
Alcohol (90 per cent.)	1·5 ml.	14½ m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Triturate the cochineal with the potassium carbonate and 200 millilitres (4 fluid ounces) of water, add the potash alum and potassium acid tartrate successively, heat on a water-bath for one hour and filter into the glycerin; add the oil of rose dissolved in the alcohol, and then pass sufficient hot distilled water through the filter to produce the required volume.

LIQUOR SACCHARI USTI

(Liq. Sacch. Ust.)

Solution of Burnt Sugar

	Metric	*Imperial*
Burnt Sugar	500 ml.	10 fl. oz.
Chloroform Water	500 ml.	10 fl. oz.

Mix.

LIQUOR SALOLIS COMPOSITUS

(Liq. Salol. Co.)

Compound Solution of Salol

Synonym—Salol Mouth Wash.

	Metric	*Imperial*
Salol	25·0 g.	½ oz.
Thymol	2·5 g.	22 gr.
Oil of Anise	1·0 ml.	10 m.
Oil of Peppermint	5·0 ml.	48 m.
Elixir of Saccharin	25·0 ml.	½ fl. oz.
Alcohol (90 per cent.) ..	to 1000·0 ml.	to 20 fl. oz.

Dissolve the salol and thymol in 500 millilitres (10 fluid ounces) of the alcohol, heating gently if necessary; then add the oil of peppermint, oil

of anise, elixir of saccharin and sufficient of the alcohol to produce the required volume, and filter.

For use as a mouth-wash, a few drops are diluted with a wine-glassful of warm water.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LIQUOR SANTALI COMPOSITUS

(Liq. Santal. Co.)

Compound Solution of Sandal Wood Oil

	Metric	*Imperial*
Oil of Sandal Wood	50·0 ml.	1 fl. oz.
Oil of Cinnamon	2·5 ml.	24 m.
Tincture of Buchu	170·0 ml.	3 fl. oz. 192 m.
Tincture of Cubeb	150·0 ml.	3 fl. oz.
Alcohol (90 per cent.)..	to 1000·0 ml.	to 20 fl. oz.

Mix, and filter if necessary.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

LIQUOR SAPONIS ÆTHEREUS

(Liq. Sap. Æther.)

Ethereal Solution of Soap

Synonyms—Ether Soap; Solutio Saponis Ætherea.

	Metric	*Imperial*
Oleic Acid	350 ml.	7 fl. oz.
Potassium Hydroxide ..	a sufficient quantity	
Distilled Water	a sufficient quantity	
Alcohol (90 per cent.)	150 ml.	3 fl. oz.
Oil of Lavender	2 ml.	20 m.
Ether	..to 1000 ml.	to 20 fl. oz.

Mix the oleic acid and alcohol and neutralise with a saturated solution of the potassium hydroxide in the distilled water (1 in 1), of which nearly 75 millilitres (1½ fluid ounces) will be required, using phenolphthalein as indicator. Allow the neutralised product to cool, add the oil of lavender and sufficient ether to produce the required volume.

It should be **stored** in well-stoppered bottles.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LIQUOR SAPONIS ANTISEPTICUS

(Liq. Sap. Antisept.)

Antiseptic Solution of Soap

Synonyms—Antiseptic Ethereal Soap; Solutio Saponis Antiseptica.

	Metric	*Imperial*
Mercuric Iodide	0·5 g.	4½ gr.
Potassium Iodide	0·5 g.	4½ gr.
Ethereal Solution of Soap	to 1000·0 ml.	to 20 fl. oz.

Dissolve.

LIQUOR SAPONIS OLEI COCOIS

(Liq. Sap. Ol. Cocois)

Solution of Coconut Oil Soap

	Metric	*Imperial*
Coconut Oil	183·1 g.	3 oz. 290 gr.
Potassium Hydroxide	19·7 g.	172 gr.
Sodium Hydroxide	19·7 g.	172 gr.
Thymol	a sufficient quantity	
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the sodium and potassium hydroxides in 200 millilitres (4 fluid ounces) of the distilled water, add the coconut oil, and set aside in a warm place until saponified; dissolve the soap in sufficient water to produce the required volume, allow to stand, separate the clear liquid, and saturate it with thymol.

LIQUOR SODÆ CHLORINATÆ

(Liq. Sod. Chlorinat.)

Solution of Chlorinated Soda

Solution of chlorinated soda is an aqueous solution of sodium hypochlorite containing a variable proportion of sodium chloride. It may be prepared by the electrolysis of sodium chloride solution, or by the following process :—

	Metric	*Imperial*
Chlorinated Lime	100 g.	2 oz.
Sodium Carbonate	150 g.	3 oz.
Distilled Water	1000 ml.	20 fl. oz.

Dissolve the sodium carbonate in 250 millilitres (5 fluid ounces) of the distilled water; thoroughly triturate the chlorinated lime with the remainder of the distilled water and mix the two liquids; shake occasionally during three or four hours, and filter.

It should be **stored** in well-stoppered bottles and protected from light.

Standard.—Solution of chlorinated soda contains not less than 2·5 per cent. and not more than 3 per cent. w/v of available chlorine.

Assay.—Add 5 millilitres to a solution of 1 gramme of potassium iodide in 100 millilitres of water acidified with 5 millilitres of hydrochloric acid, and titrate the liberated iodine with N/10 sodium thiosulphate; each millilitre of N/10 sodium thiosulphate is equivalent to 0·003546 gramme of available chlorine.

Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

LIQUOR SODÆ CHLORINATÆ CUM SODII BICARBONATE

(Liq. Sod. Chlorinat. c. Sod. Bicarb.)

Solution of Chlorinated Soda with Sodium Bicarbonate

Synonym—Daufresne's Solution.

Solution of chlorinated soda with sodium bicarbonate is prepared from finely-ground chlorinated lime, exsiccated sodium carbonate and sodium bicarbonate, the quantities being adjusted according to the proportion of available chlorine in the chlorinated lime, which must be determined immediately before use.

Percentage of available chlorine in the Chlorinated Lime	Quantities for 10 Litres of Solution		
	Chlorinated Lime	Exsiccated Sodium Carbonate	Sodium Bicarbonate
	Grammes	Grammes	Grammes
26	177	89	72
27	170	85	70
28	164	82	68
29	159	80	66
30	154	77	64
31	148	74	62
32	144	72	60
33	140	70	59
34	135	68	57
35	132	66	55
36	128	64	53
37	124	62	52

Weigh out the quantities of ingredients shown in the table. Shake the chlorinated lime with 5 litres of water in a 12 litre flask for five minutes, and allow to stand for six to twelve hours. Dissolve the sodium carbonate and bicarbonate separately in 5 litres of water, keeping the solution cold, and pour the solution into the suspension of chlorinated lime. Shake briskly, and set aside for thirty minutes. Siphon off the clear liquid, and filter through a double paper.

It should be **stored** in a cool place and protected from light.

Standard.—Solution of chlorinated soda with sodium bicarbonate, determined by the method for Liquor Sodæ Chlorinatæ, contains not less than 0·42 per cent. and not more than 0·48 per cent. w/v of available chlorine.

LIQUOR SODII ÆTHYLATIS

(Liq. Sod. Æthylat.)

Solution of Sodium Ethylate

	Metric	*Imperial*
Sodium, of commerce, clean and bright	50 g.	1 oz.
Dehydrated Alcohol	to 1000 ml.	to 20 fl. oz.

Dissolve cautiously in a flask cooled by a stream of cold water.

It should be recently prepared.

LIQUOR SODII ARSENATIS

(Liq. Sod. Arsen.)

Solution of Sodium Arsenate

	Metric	*Imperial*
Anhydrous Sodium Arsenate ..	10 g.	87½ gr.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve.

Standard.—Solution of sodium arsenate, determined by the method for Sodii Arsenas Anhydrosus, using 25 millilitres, contains not less than 0·95 per cent. and not more than 1·05 per cent. w/v of Na_2HAsO_4.

Dose.– 0·12 to 0·5 millilitre (2 to 8 minims).

LIQUOR SODII PHENATIS COMPOSITUS

(Liq. Sod. Phenat. Co.)

Compound Solution of Sodium Phenate

Synonyms—Compound Solution of Sodium Carbolate; Phenol Soda.

	Metric	*Imperial*
Phenol	31·2 g.	273 gr.
Sodium Hydroxide	3·4 g.	30 gr.
Triple Orange-flower Water	250·0 ml.	5 fl. oz.
Triple Rose Water	125·0 ml.	2½ fl. oz.
Glycerin	125·0 ml.	2½ fl. oz.
Solution of Bordeaux B	50·0 ml.	1 fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the phenol and the sodium hydroxide in 300 millilitres (6 fluid ounces) of the distilled water, add the other ingredients and sufficient distilled water to produce the required volume.

LIQUOR TARTRAZINÆ COMPOSITUS

(Liq. Tartrazin. Co.)

Compound Solution of Tartrazine

Synonym—Liquor Flavus.

	Metric	*Imperial*
Tartrazine	7·5 g.	65½ gr.
Orange G	2·5 g.	22 gr.
Glycerin	250·0 ml.	5 fl. oz.
Chloroform Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the tartrazine and orange G in about 700 millilitres (14 fluid ounces) of the chloroform water, add the glycerin and sufficient chloroform water to produce the required volume.

LIQUOR THYMOLIS COMPOSITUS

(Liq. Thymol. Co.)

Compound Solution of Thymol

Synonyms—Liquor Antisepticus; Antiseptic Solution.

	Metric	*Imperial*
Boric Acid	29·03 g.	254 gr.
Benzoic Acid	1·14 g.	10 gr.
Menthol	0·38 g.	3 gr.
Thymol	0·57 g.	5 gr.
Eucalyptol	1·25 ml.	12 m.
Oil of Peppermint	0·31 ml.	3 m.
Oil of Sweet Birch	0·31 ml.	3 m.
Oil of Thyme	0·31 ml.	3 m.
Tincture of Baptisia	50·00 ml.	1 fl. oz.
Alcohol (90 per cent.)	250·00 ml.	5 fl. oz.
Distilled Water	to 1000·00 ml.	to 20 fl. oz.

Dissolve the boric acid in 600 millilitres (12 fluid ounces) of the distilled water and add the benzoic acid dissolved in 150 millilitres (3 fluid ounces) of the alcohol. Dissolve the menthol, thymol, eucalyptol, oils of peppermint, sweet birch and thyme in the remainder of the alcohol, add the tincture of baptisia and 25 grammes ($\frac{1}{2}$ ounce) of purified talc or kaolin; shake vigorously, and add gradually, with constant shaking, the solution containing the acids. Allow the mixture to stand, with occasional shaking, for forty-eight hours; filter, and add sufficient distilled water to produce the required volume.

Dose.– 0·3 to 2 millilitres (5 to 30 minims), largely diluted.

LIQUOR TINCTORIUM

(Liq. Tinctor.)

Solution of Brilliant Green and Crystal Violet

	Metric	*Imperial*
Brilliant Green	5 g.	43¾ gr.
Crystal Violet	5 g.	43¾ gr.
Alcohol (90 per cent.)	500 ml.	10 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the brilliant green and crystal violet in the alcohol and add sufficient distilled water to produce the required volume.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LIQUOR TOLUTANUS

(Liq. Tolu.)

Solution of Tolu

	Metric	*Imperial*
Balsam of Tolu	100 g.	2 oz.
Alcohol (90 per cent.)	300 ml.	6 fl. oz.
Sucrose	500 g.	10 oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the balsam of tolu in the alcohol, add 100 grammes (2 ounces) of purified talc or kaolin and 350 millilitres (7 fluid ounces) of distilled water at a temperature of 70°; shake vigorously, and set aside for twenty-four hours; filter, dissolve the sucrose in the filtrate with the aid of gentle heat, and add sufficient distilled water to produce the required volume.

One volume of this solution diluted with seven volumes of syrup yields a syrup of tolu which is more aromatic than Syrupus Tolutanus.

LIQUOR TRINITROPHENOLIS
(Liq. Trinitrophen.)
Solution of Trinitrophenol

Synonyms—Liquor Acidi Picrici; Solution of Picric Acid.

	Metric	*Imperial*
Trinitrophenol	50 g.	1 oz.
Alcohol (90 per cent.) ..	.. to 1000 ml.	to 20 fl. oz.

Dissolve.

LIQUOR ZINCI CHLORIDI
(Liq. Zinc. Chlor.)
Solution of Zinc Chloride

	Metric	*Imperial*
Zinc, of commerce, granulated ..	400 g.	8 oz.
Hydrochloric Acid	1100 ml.	22 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the hydrochloric acid with 500 millilitres (10 fluid ounces) of distilled water in a porcelain dish, add the zinc, and heat gently until gas is no longer evolved; boil for half an hour, dilute, or evaporate if necessary, to 1000 millilitres (20 fluid ounces), and filter.

LOTIONES
Lotions

Lotions are liquid preparations intended for application to the skin, or for aural, nasal, ophthalmic, oral, or urethral irrigation. They may be aqueous or alcoholic solutions, or suspensions in aqueous vehicles. The addition of alcohol hastens the drying and accentuates the cooling effect, whilst the addition of glycerin keeps the application moist for a considerable time. Mucilage of tragacanth is suitable for use in lotions when a suspending agent is required.

Lotions are used without friction, being applied on lint or other soft, absorbent fabric and covered with water-proof material, or dabbed on the skin with a camel-hair brush or cotton wool. Lotions intended for irrigation are used warm, and applied by means of special syringes or douches adapted to the purpose. All lotions should be dispensed in bottles distinguishable by touch from those in which medicaments for internal use are sent out, and they should be labelled "Not to be taken internally."

LOTIO ACIDI BORICI
(Lot. Acid. Boric.)
Boric Acid Lotion

	Metric	*Imperial*
Boric Acid	33·3 g.	291½ gr.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve.

LOTIO ACIDI SULPHUROSI
(Lot. Acid. Sulphuros.)
Lotion of Sulphurous Acid

	Metric	*Imperial*
Sulphurous Acid	250 ml.	5 fl. oz.
Glycerin of Tannic Acid ..	250 ml.	5 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix.

LOTIO ACIDI TANNICI
(Lot. Acid. Tann.)
Lotion of Tannic Acid

	Metric	*Imperial*
Tannic Acid	20·0 g.	175 gr.
Mercuric Chloride	0·5 g.	4½ gr.
Distilled Water ..	to 1000·0 ml.	to 20 fl. oz.

Dissolve.

It should be freshly prepared.

LOTIO AMYGDALÆ AMARÆ
(Lot. Amygdal. Amar.)
Lotion of Bitter Almond

Synonyms—Mistura Amygdalæ Amaræ; Bitter Almond Mixture.

	Metric	*Imperial*
Bitter Almond	75 g.	1½ oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Blanch the bitter almond and triturate with a little of the distilled water to form a thin paste; gradually add sufficient distilled water to produce the required volume, and strain.

LOTIO BENZOINI

(Lot. Benzoin.)

Lotion of Benzoin

Synonym—Lait Virginal.

	Metric	*Imperial*
Tincture of Benzoin	25 ml.	½ fl. oz.
Rose Water	to 1000 ml.	to 20 fl. oz.

Mix.

In making this preparation the tincture of benzoin may be replaced by tincture of benzoin prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LOTIO CALAMINÆ

(Lot. Calamin.)

Calamine Lotion

	Metric	*Imperial*
Calamine	150 g.	3 oz.
Zinc Oxide	50 g.	1 oz.
Glycerin	50 ml.	1 fl. oz.
Rose Water	to 1000 ml.	to 20 fl. oz.

Triturate the calamine and zinc oxide with the glycerin and sufficient rose water to make a cream, and add sufficient rose water to produce the required volume.

LOTIO CANTHARIDINI

(Lot. Cantharidin.)

Cantharidin Lotion

Synonym—Lotio Crinalis Stimulans.

	Metric	*Imperial*
Cantharidin	0·2 g.	1¾ gr.
Acetone	50·0 ml.	1 fl. oz.
Castor Oil	200·0 ml.	4 fl. oz.
Alcohol (90 per cent.) ..	to 1000·0 ml.	to 20 fl. oz.

Dissolve the cantharidin in the acetone, add the castor oil and sufficient alcohol to produce the required volume.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LOTIO EVAPORANS

(Lot. Evap.)

Evaporating Lotion

	Metric	*Imperial*
Alcohol (90 per cent.)	125·0 ml.	2½ fl. oz.
Ammonium Chloride	34·3 g.	300 gr.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the ammonium chloride in the alcohol and part of the distilled water and add sufficient distilled water to produce the required volume.

LOTIO HYDRARGYRI FLAVA

(Lot. Hydrarg. Flav.)

Yellow Mercurial Lotion

Synonym—Yellow Wash.

	Metric	*Imperial*
Mercuric Chloride	4·6 g.	40 gr.
Solution of Calcium Hydroxide..	1000·0 ml.	20 fl. oz.

Mix.

LOTIO OLEI AMYGDALÆ AMMONIATA

(Lot. Ol. Amygdal. Ammon.)

Ammoniated Almond Oil Lotion

Synonyms—Erasmus Wilson's Hair Lotion; Lotio Crinalis.

	Metric	*Imperial*
Almond Oil	125·0 ml.	2½ fl. oz.
Strong Solution of Ammonia ..	125·0 ml.	2½ fl. oz.
Oil of Rosemary	5·2 ml.	50 m.
Alcohol (90 per cent.)	500·0 ml.	10 fl. oz.
Honey Water	to 1000·0 ml.	to 20 fl. oz.

Mix the almond oil with the strong solution of ammonia and add the oil of rosemary, alcohol and sufficient honey water to produce the required volume.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LOTIO PHENOLIS
(Lot. Phenol.)
Phenol Lotion

Synonyms—Lotio Acidi Carbolici; Carbolic Acid Lotion.

	Metric	*Imperial*
Phenol	12·5 g.	109½ gr.
Solution of Bordeaux B	1·0 ml.	10 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the phenol in warmed distilled water, cool, add the solution of bordeaux B and sufficient distilled water to produce the required volume.

LOTIO PICIS CARBONIS ALKALINA
(Lot. Pic. Carbon. Alk.)
Alkaline Lotion of Coal Tar

	Metric	*Imperial*
Solution of Coal Tar	20·8 ml.	200 m.
Sodium Bicarbonate	12·5 g.	¼ oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the sodium bicarbonate in about 900 millilitres (18 fluid ounces) of the distilled water, add the solution of coal tar and sufficient distilled water to produce the required volume.

LOTIO PICIS CARBONIS ET PLUMBI
(Lot. Pic. Carbon. et Plumb.)
Coal Tar and Lead Lotion

	Metric	*Imperial*
Solution of Coal Tar	31·2 ml.	300 m.
Strong Solution of Lead Subacetate	31·2 ml.	300 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Mix the strong solution of lead subacetate with about 900 millilitres (18 fluid ounces) of distilled water, add the solution of coal tar and sufficient distilled water to produce the required volume.

LOTIO PLUMBI CUM OPIO
(Lot. Plumb. c. Opio)
Lead and Opium Lotion

	Metric	*Imperial*
Tincture of Opium	50 ml.	1 fl. oz.
Dilute Solution of Lead Subacetate	to 1000 ml.	to 20 fl. oz.

Mix.

LOTIO PLUMBI EVAPORANS

(Lot. Plumb. Evap.)

Evaporating Lead Lotion

	Metric	*Imperial*
Strong Solution of Lead Subacetate	12·5 ml.	120 m.
Alcohol (90 per cent.)	200·0 ml.	4 fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Mix.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LOTIO POTASSÆ SULPHURATÆ

(Lot. Potass. Sulphurat.)

Lotion of Sulphurated Potash

Synonym—Lotio Zinci Sulphidi.

	Metric	*Imperial*
Sulphurated Potash	22·9 g.	200 gr.
Zinc Sulphate	22·9 g.	200 gr.
Rose Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the zinc sulphate in about 800 millilitres (16 fluid ounces) of the rose water, add the solution to the sulphurated potash previously powdered, and stir; then add sufficient rose water to produce the required volume.

LOTIO ROSÆ

(Lot. Ros.)

Rose Lotion

Synonyms—Lac Rosæ; Milk of Roses.

	Metric	*Imperial*
Sweet Almond	100·0 g.	2 oz.
Curd Soap	6·9 g.	60 gr.
White Beeswax	6·9 g.	60 gr.
Almond Oil	6·2 ml.	60 m.
Oil of Bergamot	6·2 ml.	60 m.
Oil of Lavender	1·6 ml.	15 m.
Oil of Rose	0·8 ml.	8 m.
Alcohol (90 per cent.)	150·0 ml.	3 fl. oz.
Rose Water	to 1000·0 ml.	to 20 fl. oz.

Blanch the almonds and beat them with seven times their weight of rose water; add the resulting emulsion gradually to the curd soap, white

beeswax and almond oil, previously mixed by the aid of gentle heat; strain the emulsion, add the oils dissolved in the alcohol and sufficient rose water to produce the required volume.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LOTIO RUBRA

(Lot. Rub.)

Red Lotion

Synonym—Red Wash.

	Metric	*Imperial*
Zinc Sulphate	4·5 g.	39½ gr.
Compound Tincture of Lavender	20·8 ml.	200 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve.

LOTIO STAPHISAGRIÆ

(Lot. Staphisag.)

Stavesacre Lotion

Synonym—Nursery Hair Lotion.

	Metric	*Imperial*
Stavesacre, in coarse powder ..	100·0 g.	2 oz.
Acetic Acid	50·0 ml.	1 fl. oz.
Alcohol (90 per cent.)	100 0 ml.	2 fl. oz.
Oil of Geranium	0·2 ml.	2 m.
Oil of Lavender	0·2 ml.	2 m.
Oil of Lemon	0·4 ml.	4 m.
Glycerin	50·0 ml.	1 fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Boil the stavesacre with the acetic acid and 800 millilitres (16 fluid ounces) of distilled water for ten minutes in a covered vessel, set aside until cold, then add the oils previously dissolved in the alcohol, filter, add the glycerin and sufficient distilled water to produce the required volume.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LOTIO SULPHURIS
(Lot. Sulphur.)
Sulphur Lotion

	Metric	*Imperial*
Precipitated Sulphur	68·6 g.	1 oz. 162½ gr.
Alcohol (90 per cent.)	125·0 ml.	2½ fl. oz.
Glycerin	31·2 ml.	300 m.
Rose Water	400 0 ml.	8 fl. oz.
Solution of Calcium Hydroxide	to 1000·0 ml.	to 20 fl. oz.

Triturate the precipitated sulphur with the alcohol, glycerin and rose water to form a smooth cream, and add sufficient solution of calcium hydroxide to produce the required volume.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

LOTIO TRAGACANTHÆ
(Lot. Trag.)
Tragacanth Lotion

Synonym—Lotio Emollients.

	Metric	*Imperial*
Tragacanth, in powder	5·50 g.	48 gr.
Spirit of Chloroform	18·75 ml.	180 m.
Tincture of Tolu	18·75 ml.	180 m.
Cologne Spirit	25·00 ml.	½ fl. oz.
Glycerin	18·75 ml.	180 m.
Distilled Water	to 1000·00 ml.	to 20 fl. oz.

Shake the tragacanth with the spirit of chloroform, the tincture of tolu and the cologne spirit, add the glycerin and sufficient distilled water to produce the required volume, and shake vigorously.

LOTIO TRINITROPHENOLIS
(Lot. Trinitrophen.)
Lotion of Trinitrophenol

Synonyms—Lotio Acidi Picrici; Picric Acid Lotion.

	Metric	*Imperial*
Trinitrophenol	10 g.	87½ gr.
Distilled Water	.. to 1000 ml.	to 20 fl. oz.

Dissolve.

MISTURA ACIDI ACETYLSALICYLICI
(Mist. Acid. Acetylsalicyl.)

Mixture of Acetylsalicylic Acid

Synonym—Aspirin Mixture.

	Metric	*Imperial*
Acetylsalicylic Acid	34·3 g.	300 gr.
Compound Powder of Tragacanth	22·9 g.	200 gr.
Chloroform Water to	1000·0 ml.	to 20 fl. oz.

Reduce the acetylsalicylic acid to fine powder and mix with the compound powder of tragacanth; add gradually, with constant trituration, sufficient chloroform water to produce the required volume.

It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA ACIDI ACETYLSALICYLICI COMPOSITA
(Mist. Acid. Acetylsalicyl. Co.)

Compound Mixture of Acetylsalicylic Acid

Synonym—Compound Aspirin Mixture.

	Metric	*Imperial*
Acetylsalicylic Acid	34·3 g.	300 gr.
Potassium Citrate	68 6 g.	1 oz. 162½ gr.
Syrup of Lemon	41 7 ml.	400 m.
Chloroform Water to	1000 0 ml.	to 20 fl. oz.

Dissolve the potassium citrate in about 900 millilitres (18 fluid ounces) of the chloroform water and dissolve the acetylsalicylic acid in the solution: add the syrup of lemon and sufficient chloroform water to produce the required volume.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA ACIDI PHOSPHORICI
(Mist. Acid. Phosph.)

Phosphoric Acid Mixture

	Metric	*Imperial*
Dilute Phosphoric Acid	31·2 ml.	300 m.
Emulsion of Chloroform ..	20·8 ml.	200 m.
Syrup of Orange	41·7 ml.	400 m.
Compound Infusion of Gentian..to	1000·0 ml.	to 20 fl. oz.

Mix.

It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA ACIDI SULPHURICI CUM OPIO

(Mist. Acid. Sulph. c. Opio)

Sulphuric Acid Mixture with Opium

	Metric	*Imperial*
Dilute Sulphuric Acid	41·7 ml.	400 m.
Tincture of Opium	15 6 ml.	150 m.
Tincture of Capsicum	4·2 ml.	40 m.
Camphor Water	..to 1000·0 ml.	to 20 fl. oz.

Mix.
It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA ÆTHERIS CUM AMMONIA

(Mist. Æther. c. Ammon.)

Ether Mixture with Ammonia

	Metric	*Imperial*
Spirit of Ether	62·5 ml.	1¼ fl. oz.
Aromatic Spirit of Ammonia ..	62·5 ml.	1¼ fl. oz.
Camphor Water	..to 1000·0 ml.	to 20 fl. oz.

Mix.
It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA ALBA

(Mist. Alb.)

White Mixture

	Metric	*Imperial*
Light Magnesium Carbonate ..	45·7 g.	400 gr.
Magnesium Sulphate	274·3 g.	5 oz. 212½ gr.
Peppermint Water ..	..to 1000·0 ml.	to 20 fl. oz.

Dissolve the magnesium sulphate in a sufficient quantity of the peppermint water, add the light magnesium carbonate, and sufficient peppermint water to produce the required volume.
It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA AMMONIACI
(Mist. Ammoniac.)

Ammoniacum Mixture

	Metric	*Imperial*
Ammoniacum	30 g.	262½ gr.
Syrup of Tolu	60 ml.	1 fl. oz. 96 m.
Distilled Water	.. to 1000 ml.	to 20 fl. oz.

Crush the ammoniacum and triturate thoroughly with a little of the distilled water to form a thin paste; gradually add the remainder of the distilled water and the syrup of tolu, triturating until the mixture assumes a uniform milky appearance, and strain through fine muslin.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA AMMONIÆ CUM SENEGA
(Mist. Ammon. c. Seneg.)

Ammonia Mixture with Senega

	Metric	*Imperial*
Ammonium Carbonate	9·1 g.	80 gr.
Ammonium Chloride	11·4 g.	100 gr.
Tincture of Ipecacuanha ..	20·8 ml.	200 m.
Syrup of Tolu	62·5 ml.	1¾ fl. oz.
Infusion of Senega ..	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the ammonium carbonate and the ammonium chloride in a portion of the infusion, add the tincture of ipecacuanha, syrup of tolu and sufficient infusion of senega to produce the required volume.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA AMMONII ACETATIS COMPOSITA
(Mist. Ammon. Acet. Co.)

Compound Ammonium Acetate Mixture

Synonym—Mistura Diaphoretica.

	Metric	*Imperial*
Potassium Citrate	45·7 g.	400 gr.
Strong Solution of Ammonium Acetate	41·7 ml.	400 m.
Spirit of Nitrous Ether	41·7 ml.	400 m.
Spirit of Chloroform	41·7 ml.	400 m
Camphor Water	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the potassium citrate in about 500 millilitres (10 fluid ounces) of the camphor water, add the other ingredients and sufficient camphor water to produce the required volume.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA AMYGDALÆ

(Mist. Amygdal.)

Almond Mixture

	Metric	*Imperial*
Compound Powder of Almond	125 g.	2½ oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Triturate the powder with a little of the distilled water to form a thin paste; gradually add the remainder of the distilled water and strain through fine muslin.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA BISMUTHI COMPOSITA

(Mist. Bism. Co.)

Compound Bismuth Mixture

	Metric	*Imperial*
Concentrated Solution of Bismuth	500·0 ml.	10 fl. oz.
Chloroform	8·3 ml.	80 m.
Tincture of Nux Vomica ..	125·0 ml.	2½ fl. oz.
Dilute Hydrocyanic Acid ..	33·4 ml.	320 m.
Solution of Bordeaux B	20·8 ml.	200 m.
Distilled Water	..to 1000·0 ml.	to 20 fl. oz.

Dilute the concentrated solution of bismuth with half its volume of water and add the chloroform dissolved in the tincture of nux vomica; filter if necessary through purified talc or kaolin, add the dilute hydrocyanic acid and the solution of bordeaux B, and pass sufficient distilled water through the filter to produce the required volume.

It should be recently prepared.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

MISTURA BISMUTHI COMPOSITA ACIDA CUM PEPSINO

(Mist. Bism. Co. Acid. c. Pepsin.)

Compound Acid Mixture of Bismuth with Pepsin

	Metric	*Imperial*
Acid Solution of Bismuth ..	350·0 ml.	7 fl. oz.
Pepsin	18·3 g.	160 gr.
Liquid Extract of Nux Vomica..	10·4 ml.	100 m.
Dilute Hydrocyanic Acid ..	33·4 ml.	320 m.
Solution of Bordeaux B ..	20·8 ml.	200 m.
Double Chloroform Water ..to	1000·0 ml.	to 20 fl. oz.

Dissolve the pepsin in about 500 millilitres (10 fluid ounces) of double chloroform water and add the acid solution of bismuth and the liquid extract of nux vomica; filter if necessary and add the solution of bordeaux B, the dilute hydrocyanic acid and sufficient double chloroform water to produce the required volume.

It should be recently prepared.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

MISTURA BISMUTHI COMPOSITA CUM PEPSINO

(Mist. Bism. Co. c. Pepsin.)

Compound Bismuth Mixture with Pepsin

	Metric	*Imperial*
Concentrated Solution of Bismuth	500·0 ml.	10 fl. oz.
Pepsin	18·3 g.	160 gr.
Chloroform	8·3 ml.	80 m.
Tincture of Nux Vomica ..	125·0 ml.	2½ fl. oz.
Dilute Hydrocyanic Acid ..	33·4 ml.	320 m.
Solution of Bordeaux B ..	20·8 ml.	200 m.
Distilled Water to	1000·0 ml.	to 20 fl. oz.

Dissolve the pepsin in 250 millilitres (5 fluid ounces) of distilled water and add the solution to the concentrated solution of bismuth; add the chloroform dissolved in the tincture of nux vomica and, if necessary, filter through purified talc or kaolin; add the dilute hydrocyanic acid and the solution of bordeaux B, and pass sufficient distilled water through the filter to produce the required volume.

It should be recently prepared.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

MISTURA BISMUTHI COMPOSITA CUM PEPSINO ET MORPHINA

(Mist. Bism. Co. c. Pepsin. et Morph.)

Compound Bismuth Mixture with Pepsin and Morphine

	Metric	*Imperial*
Morphine Hydrochloride ..	0·46 g.	4 gr.
Compound Bismuth Mixture with Pepsin to	1000·0 ml.	to 20 fl. oz.

Dissolve.
It should be recently prepared.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

MISTURA BISMUTHI ET MAGNESII HYDROXIDUM

(Mist. Bism. et Mag. Hydrox.)

Mixture of Bismuth and Magnesium Hydroxides

	Metric	*Imperial*
Mixture of Bismuth Hydroxide	500 ml.	10 fl. oz.
Mixture of Magnesium Hydroxide	500 ml.	10 fl. oz.

Mix.
It should be **stored** in well-closed bottles and protected from light.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

MISTURA BISMUTHI ET PANCREATINI

(Mist. Bism. et Pancreatin.)

Mixture of Bismuth and Pancreatin

	Metric	*Imperial*
Bismuth Carbonate	22·9 g.	200 gr.
Sodium Bicarbonate	22·9 g.	200 gr.
Pancreatin	9·14 g.	80 gr.
Dilute Hydrocyanic Acid ..	4·17 ml.	40 m.
Chloroform Water to	1000·0 ml.	to 20 fl. oz.

Dissolve the pancreatin in a portion of the chloroform water, add the other ingredients and sufficient chloroform water to produce the required volume.
It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA BISMUTHI ET SODII BICARBONATIS

(Mist. Bism. et Sod. Bicarb.)

Bismuth and Sodium Bicarbonate Mixture

Synonyms—Mistura Bismuthi cum Soda; Bismuth and Soda Mixture.

	Metric	*Imperial*
Bismuth Carbonate	22·9 g.	200 gr.
Sodium Bicarbonate	22·9 g.	200 gr.
Light Magnesium Carbonate ..	22·9 g.	200 gr.
Glycerin	50·0 ml.	1 fl. oz.
Distilled Water	..to 1000·0 ml.	to 20 fl. oz.

Mix.

It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA BISMUTHI HYDROXIDI

(Mist. Bism. Hydrox.)

Mixture of Bismuth Hydroxide

Synonym—Magma Bismuthi.

	Metric	*Imperial*
Bismuth Subnitrate	125 g.	2½ oz.
Nitric Acid	90 ml.	1 fl. oz. 384 m.
Sodium Hydroxide	90 g.	1 oz. 350 gr.
Distilled Water	..to 1000 ml.	to 20 fl. oz.

Mix the bismuth subnitrate with 75 millilitres (1½ fluid ounces) of distilled water, add the nitric acid and warm gently until the bismuth subnitrate is dissolved. Dissolve the sodium hydroxide in 5000 millilitres (5 pints) of water and add the bismuth solution in one quantity, stirring rapidly. Allow the precipitate to subside and pour off the clear liquid; collect the precipitate on a calico strainer and wash with water, maintaining a layer of liquid above the precipitate, until the washings are neutral to phenolphthalein; allow the residue to drain and mix it with sufficient distilled water to produce the required volume.

It should be **stored** in well-closed bottles and protected from light.

Standard.—Mixture of bismuth hydroxide yields, on evaporating to dryness and igniting the residue to constant weight, not less than 9 per cent. and not more than 11 per cent. w/v of Bi_2O_3. To 1 millilitre of a 5 per cent. v/v dilution add 5 drops of phenoldisulphonic acid solution and evaporate to dryness on a water-bath; add 10 millilitres of dilute solution of ammonia, filter, and wash the precipitate with water until

the mixed filtrate and washings measure 100 millilitres. The colour of the resulting liquid is not deeper than that obtained by similarly treating 1 millilitre of a 0·01 per cent. w/v solution of potassium nitrate (limit of nitrate).

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

MISTURA BROMIDI COMPOSITA
(Mist. Brom. Co.)

Compound Mixture of Bromides

	Metric	*Imperial*
Ammonium Bromide	22·9 g.	200 gr.
Potassium Bromide	22·9 g.	200 gr.
Sodium Bromide	22·9 g.	200 gr.
Tincture of Nux Vomica ..	20·8 ml.	200 m.
Solution of Carmine	3·1 ml.	30 m.
Glycerin	62·5 ml.	1¼ fl. oz.
Chloroform Water ..	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the bromides in about 500 millilitres (10 fluid ounces) of the chloroform water; add the tincture of nux vomica, solution of carmine, glycerin and sufficient chloroform water to produce the required volume.

It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA CASCARÆ COMPOSITA
(Mist. Casc. Co.)

Compound Mixture of Cascara

	Metric	*Imperial*
Liquid Extract of Cascara Sagrada	41·7 ml.	400 m.
Liquid Extract of Liquorice ..	62·5 ml.	1¼ fl. oz.
Tincture of Belladonna	10·4 ml.	100 m.
Tincture of Nux Vomica ..	10·4 ml.	100 m.
Aromatic Spirit of Ammonia ..	41·7 ml.	400 m.
Glycerin	62·5 ml.	1¼ fl. oz.
Chloroform Water ..	.. to 1000·0 ml.	to 20 fl. oz.

Mix.

It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA CHLOROFORMI COMPOSITA
(Mist. Chlorof. Co.)

Compound Chloroform Mixture

Synonyms—Mistura Tussi Sedativa; Mistura Tussi Rubra.

	Metric	*Imperial*
Morphine Hydrochloride	0·9 g.	8 gr.
Dilute Hydrobromic Acid	250·0 ml.	5 fl. oz.
Chloroform	4·2 ml.	40 m.
Solution of Bordeaux B	20·8 ml.	200 m.
Cherry-laurel Water	250·0 ml.	5 fl. oz.
Syrup of Tolu	250·0 ml.	5 fl. oz.
Syrup	to 1000·0 ml.	to 20 fl. oz.

Dissolve the morphine hydrochloride in the cherry-laurel water, add the syrup of tolu and dilute hydrobromic acid, then add the solution of bordeaux B, chloroform and sufficient syrup to produce the required volume, and shake until the chloroform is dissolved.

It should be recently prepared.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

MISTURA CRETÆ
(Mist. Cret.)

Chalk Mixture

	Metric	*Imperial*
Chalk	30 g.	262½ gr.
Tragacanth, in powder	5 g.	43¾ gr.
Sucrose	60 g.	1 oz. 87½ gr.
Cinnamon Water	to 1000 ml.	to 20 fl. oz.

Triturate the chalk with the tragacanth and sucrose and add gradually, with constant trituration, sufficient cinnamon water to produce the required volume.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA CRETÆ COMPOSITA
(Mist. Cret. Co.)

Compound Chalk Mixture

	Metric	*Imperial*
Aromatic Powder of Chalk	20·57 g.	180 gr.
Chalk	20·57 g.	180 gr.
Tragacanth, in powder	4·57 g.	40 gr.
Sucrose	50·00 g.	1 oz.
Aromatic Spirit of Ammonia	18·75 ml.	180 m.
Tincture of Catechu	62·50 ml.	1¼ fl. oz.
Compound Tincture of Cardamom	37·50 ml.	360 m.
Tincture of Opium	6·25 ml.	60 m.
Cinnamon Water	to 1000·00 ml.	to 20 fl. oz.

Triturate the chalk with the tragacanth and the other powders, and gradually add, with constant trituration, sufficient cinnamon water to produce about 500 millilitres (10 fluid ounces); then add the tinctures and the aromatic spirit of ammonia, previously mixed together, and sufficient cinnamon water to produce the required volume.

It should be recently prepared.

Dose.– 30 millilitres (1 fluid ounce) for an adult; 15 millilitres (½ fluid ounce) for a child twelve years old; 8 millilitres (2 fluid drachms) for a child seven years old.

MISTURA DAMIANÆ COMPOSITA

(Mist. Damian. Co.)

Compound Damiana Mixture

	Metric	*Imperial*
Liquid Extract of Damiana ..	250·0 ml.	5 fl. oz.
Liquid Extract of Nux Vomica	16·7 ml.	160 m.
Calcium Hypophosphite ..	45·7 g.	400 gr.
Sodium Hypophosphite	45·7 g.	400 gr.
Chloroform Water .. .	to 1000·0 ml.	to 20 fl. oz.

Dissolve the calcium and sodium hypophosphites in 600 millilitres (12 fluid ounces) of chloroform water, add the liquid extracts, mix, and add sufficient chloroform water to produce the required volume.

It should be recently prepared.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

MISTURA FERRI COMPOSITA

(Mist. Ferr. Co.)

Compound Iron Mixture

Synonym—Griffith's Mixture.

	Metric	*Imperial*
Ferrous Sulphate, in powder ..	6 g.	52½ gr.
Potassium Carbonate	8 g.	70 gr.
Myrrh	15 g.	131¼ gr.
Acacia, in powder	15 g.	131¼ gr.
Liquid Glucose	15 g.	131¼ gr.
Spirit of Nutmeg	10 ml.	96 m.
Rose Water	to 1000 ml.	to 20 fl. oz.

Crush the myrrh, add the potassium carbonate, liquid glucose and acacia, and triturate the mixture with a small quantity of rose water to form a thin paste; gradually add more rose water and the spirit of nutmeg, continuing the trituration and further addition of rose water until 1000 millilitres (20 fluid ounces) of liquid is produced; add the ferrous sulphate and shake until dissolved.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA FERRI CUM MALTO
(Mist. Ferr. c. Malt.)

Mixture of Iron with Malt

	Metric	*Imperial*
Soluble Iron Pyrophosphate ..	54·9 g.	1 oz. 42½ gr.
Distilled Water	50·0 ml.	1 fl. oz.
Liquid Extract of Malt ..	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the soluble iron pyrophosphate in the distilled water and add sufficient liquid extract of malt to produce the required volume.

It should be recently prepared.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

MISTURA GENTIANÆ ACIDA
(Mist. Gent. Acid.)

Acid Gentian Mixture

	Metric	*Imperial*
Dilute Nitro-hydrochloric Acid	25·0 ml.	½ fl. oz.
Compound Infusion of Gentian	500 0 ml.	10 fl. oz.
Syrup of Orange	62·5 ml.	1¼ fl. oz.
Chloroform Water ..	.. to 1000·0 ml.	to 20 fl. oz.

Mix.

It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA GENTIANÆ ALKALINA
(Mist. Gent. Alk.)

Alkaline Gentian Mixture

Synonym—Mistura Gentianæ cum Soda.

	Metric	*Imperial*
Sodium Bicarbonate	34·3 g.	300 gr.
Ammonium Carbonate	11·4 g.	100 gr.
Syrup of Orange	62·5 ml.	1¼ fl. oz.
Compound Infusion of Gentian	to 1000·0 ml.	to 20 fl. oz.

Dissolve the sodium bicarbonate and ammonium carbonate in about 500 millilitres (10 fluid ounces) of the compound infusion of gentian, add the syrup of orange and sufficient compound infusion of gentian to produce the required volume.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA GUAIACI
(Mist. Guaiac.)
Guaiacum Mixture

	Metric	*Imperial*
Guaiacum Resin	25 g.	½ oz.
Sucrose	25 g.	½ oz.
Tragacanth, in powder	5 g.	43¾ gr.
Cinnamon Water	to 1000 ml.	to 20 fl. oz.

Triturate the guaiacum resin, sucrose and tragacanth with sufficient cinnamon water, added gradually, to produce the required volume.

It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA IPECACUANHÆ COMPOSITA
(Mist. Ipecac. Co.)
Compound Ipecacuanha Mixture

Synonym—Mistura Expectorans.

	Metric	*Imperial*
Vinegar of Ipecacuanha	50·0 ml.	1 fl. oz.
Strong Solution of Ammonium Acetate	31·2 ml.	300 m.
Oxymel of Squill	31·2 ml.	300 m.
Glycerin	83·3 ml.	1 fl. oz. 320 m.
Chloroform Water	to 1000·0 ml.	to 20 fl. oz.

Mix.

It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA LOBELIÆ ET STRAMONII COMPOSITA
(Mist. Lobel. et Stramon. Co.)
Compound Mixture of Lobelia and Stramonium

	Metric	*Imperial*
Ammonium Carbonate	9·1 g.	80 gr.
Potassium Iodide	11·4 g.	100 gr.
Ethereal Tincture of Lobelia ..	20·8 ml.	200 m.
Tincture of Stramonium ..	20·8 ml.	200 m.
Chloroform Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the ammonium carbonate and potassium iodide in part of the chloroform water; add the tinctures and sufficient chloroform water to produce the required volume.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA MAGNESII HYDROXIDI ET PARAFFINI LIQUIDI

(Mist. Mag. Hydrox. et Paraff. Liq.)

Mixture of Magnesium Hydroxide and Liquid Paraffin

	Metric	*Imperial*
Liquid Paraffin	300·0 ml.	6 fl. oz.
Vanillin, in powder	0·03 g.	½ gr.
Mixture of Magnesium Hydroxide	700·0 ml.	14 fl. oz.

Triturate the vanillin with the liquid paraffin, add the mixture of magnesium hydroxide and emulsify by means of a homogenising machine or, alternatively, by means of 75 grammes (1½ ounces) of acacia in powder triturated first with the liquid paraffin.

It should be recently prepared.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

MISTURA OLEI RICINI

(Mist. Ol. Ricin.)

Castor Oil Mixture

	Metric	*Imperial*
Castor Oil	375 ml.	7½ fl. oz.
Acacia, in powder	100 g.	2 oz.
Triple Orange-flower water ..	150 ml.	3 fl. oz.
Cinnamon Water	to 1000 ml.	to 20 fl. oz.

Triturate quickly the castor oil with the acacia; without delay add, in one quantity, 200 millilitres (4 fluid ounces) of cinnamon water and stir briskly until emulsified; then add, with constant trituration, the orange-flower water and sufficient cinnamon water to produce the required volume.

It should be freshly prepared.

Dose (as a single draught).– 30 to 60 millilitres (1 to 2 fluid ounces).

MISTURA POTASSII ACETATIS COMPOSITA

(Mist. Pot. Acet. Co.)

Compound Potassium Acetate Mixture

Synonym—Mistura Diuretica.

	Metric	*Imperial*
Potassium Acetate	45·7 g.	400 gr.
Spirit of Nitrous Ether	62·5 ml.	1¼ fl. oz.
Tincture of Hyoscyamus ..	41·7 ml.	400 m.
Juice of Scoparium	125·0 ml.	2½ fl. oz.
Infusion of Buchu ..	to 1000·0 ml.	to 20 fl. oz.

Dissolve the potassium acetate in about 500 millilitres (10 fluid ounces) of the infusion of buchu, add the other ingredients and sufficient infusion of buchu to produce the required volume.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA QUININÆ SALICYLATIS

(Mist. Quinin. Salicyl.)

Mixture of Quinine Salicylate

	Metric	*Imperial*
Ammoniated Solution of Quinine	62·5 ml.	1¼ fl. oz.
Potassium Citrate	22·9 g.	200 gr.
Sodium Salicylate	22·9 g.	200 gr.
Glycerin	125·0 ml.	2½ fl. oz.
Compound Infusion of Gentian to	1000·0 ml.	to 20 fl. oz.

Dissolve the potassium citrate and sodium salicylate in about 750 millilitres (15 fluid ounces) of the compound infusion of gentian, add the ammoniated solution of quinine and glycerin, previously mixed, and sufficient compound infusion of gentian to produce the required volume.

It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA RHEI ET CASCARÆ

(Mist. Rhei et Casc.)

Rhubarb and Cascara Mixture

	Metric	*Imperial*
Rhubarb, in powder	9·1 g.	80 gr.
Sodium Bicarbonate	27·4 g.	240 gr.
Liquid Extract of Liquorice ..	31·2 ml.	300 m.
Liquid Extract of Cascara Sagrada	41·7 ml.	400 m.
Syrup of Ginger	62·5 ml.	1¼ fl. oz.
Oil of Peppermint	1·6 ml.	15 m.
Chloroform Water to	1000·0 ml.	to 20 fl. oz.

Triturate the rhubarb and sodium bicarbonate with the oil of peppermint and the syrup of ginger; add gradually, with constant trituration, the liquid extract of liquorice, the liquid extract of cascara sagrada and sufficient chloroform water to produce the required volume.

It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA RHEI ET SODII BICARBONATIS
(Mist. Rhei et Sod. Bicarb.)

Rhubarb and Sodium Bicarbonate Mixture

Synonyms—Mistura Rhei Composita; Mistura Rhei et Sodæ.

	Metric	*Imperial*
Rhubarb, in powder	9·1 g.	80 gr.
Sodium Bicarbonate	27·4 g.	240 gr.
Syrup of Ginger	62·5 ml.	1¼ fl. oz.
Oil of Peppermint	1·6 ml.	15 m.
Chloroform Water ..	..to 1000·0 ml.	to 20 fl. oz.

Triturate the rhubarb and sodium bicarbonate with the oil of peppermint and the syrup of ginger, and add gradually, with constant trituration, sufficient chloroform water to produce the required volume.

It should be recently prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA SODII BICARBONATIS AROMATICA
(Mist. Sod. Bicarb. Aromat.)

Aromatic Sodium Bicarbonate Mixture

Synonyms—Mistura Carminativa; Carminative Mixture.

	Metric	*Imperial*
Sodium Bicarbonate	22·9 g.	200 gr.
Aromatic Spirit of Ammonia ..	25·0 ml.	½ fl. oz.
Compound Tincture of Cardamom	50·0 ml.	1 fl. oz.
Glycerin	75·0 ml.	1½ fl. oz.
Dill Water	..to 1000·0 ml.	to 20 fl. oz.

Dissolve the sodium bicarbonate in about 800 millilitres (16 fluid ounces) of dill water, add the aromatic spirit of ammonia, compound tincture of cardamom, glycerin and sufficient dill water to produce the required volume.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MISTURA SPIRITUS VINI GALLICI
(Mist. Sp. Vin. Gall.)

Mixture of Brandy

	Metric	*Imperial*
Brandy	456 ml.	8 fl. oz.
Cinnamon Water	456 ml.	8 fl. oz.
Sucrose	57 g.	1 oz.
Yolk of Egg	114 ml.	2 fl. oz.

Triturate together the yolk of egg and sucrose, add the cinnamon water and brandy, and mix.

It should be freshly prepared.

Dose (as a draught).– 30 to 60 millilitres (1 to 2 fluid ounces).

MISTURA VALERIANÆ COMPOSITA
(Mist. Valerian. Co.)

Compound Valerian Mixture

	Metric	*Imperial*
Potassium Bromide	22·9 g.	200 gr.
Ammoniated Tincture of Valerian	62·5 ml.	1¼ fl. oz.
Camphor Water to	1000·0 ml.	to 20 fl. oz.

Dissolve the potassium bromide in a portion of the camphor water, add the ammoniated tincture of valerian and sufficient camphor water to produce the required volume.

It should be freshly prepared.

Dose.– 15 to 30 millilitres (½ to 1 fluid ounce).

MUCILAGO LINI
(Mucil. Lini)

Mucilage of Linseed

	Metric	*Imperial*
Linseed	125 g.	2½ oz.
Distilled Water, boiling	1000 ml.	20 fl. oz.

Infuse the linseed in the water for fifteen minutes and strain.

It should be freshly prepared.

NEBULÆ

Sprays

Sprays are solutions of medicaments in aqueous, oily, alcoholic, or glycerinated media, intended to be applied to the nose or throat by means of an atomiser. The choice of atomiser depends on the viscosity of the liquid; a spray made with an oily vehicle needs a more powerful

atomiser than one made with water or alcohol. Medicaments should be completely dissolved and should not be suspended. Paraffinum Liquidum Leve is more suitable than Paraffinum Liquidum for the preparation of sprays.

NEBULA ADRENALINÆ AROMATICA

(Neb. Adrenal. Aromat.)

Aromatic Adrenaline Spray

Synonyms—Adrenaline Inhalant; Aromatic Solution of Adrenaline.

	Metric	*Imperial*
Adrenaline	1 g.	$8\frac{3}{4}$ gr.
Dehydrated Alcohol	125 ml.	$2\frac{1}{2}$ fl. oz.
Hydrochloric Acid	a sufficient quantity	
Eucalyptol	50 ml.	1 fl. oz.
Oil of Sweet Birch	20 ml.	192 m.
Castor Oil	500 ml.	10 fl. oz.
Arachis Oil	to 1000 ml.	to 20 fl. oz.

Add the adrenaline to the dehydrated alcohol and very cautiously add just sufficient hydrochloric acid, approximately 0·8 millilitre (8 minims), to dissolve it; the acid may be conveniently applied by means of a glass rod dipped alternately into the acid and the alcoholic solution, and shaking the mixture after each addition of acid. When solution of the adrenaline is complete, mix with the castor oil, then add the eucalyptol, oil of sweet birch and sufficient arachis oil to produce the required volume.

It should be **stored** in completely-filled, well-closed bottles, and protected from light.

NEBULA ADRENALINÆ ET COCAINÆ

(Neb. Adrenal. et Cocain.)

Adrenaline and Cocaine Spray

	Metric	*Imperial*
Solution of Adrenaline Hydrochloride	200·0 ml.	4 fl. oz.
Cocaine Hydrochloride	10·0 g.	$87\frac{1}{2}$ gr.
Chlorbutol	4·0 g.	35 gr.
Sodium Chloride	7·2 g.	63 gr.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the cocaine hydrochloride, chlorbutol and sodium chloride in part of the distilled water, add the solution of adrenaline hydrochloride and sufficient distilled water to produce the required volume.

NEBULA ADRENALINÆ ET EPHEDRINÆ

(Neb. Adrenal. et Ephed.)

Adrenaline and Ephedrine Spray

	Metric	*Imperial*
Solution of Adrenaline Hydrochloride	125·0 ml.	2½ fl. oz.
Ephedrine Hydrochloride ..	22·9 g.	200 gr.
Glycerin of Phenol	20·8 ml.	200 m.
Cinnamon Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the ephedrine hydrochloride in part of the cinnamon water, add the solution of adrenaline hydrochloride, the glycerin of phenol and sufficient cinnamon water to produce the required volume.

NEBULA ADRENALINÆ ET EPHEDRINÆ OLEOSA

(Neb. Adrenal. et Ephed. Oleos.)

Oily Adrenaline and Ephedrine Spray

	Metric	*Imperial*
Adrenaline	0·1 g.	1 gr.
Ephedrine	20·0 g.	175 gr.
Dehydrated Alcohol	125·0 ml.	2½ fl. oz.
Hydrochloric Acid	a sufficient quantity	
Menthol	20·0 g.	175 gr.
Eucalyptol	8·0 ml.	77 m.
Castor Oil	500·0 ml.	10 fl. oz.
Arachis Oil	to 1000·0 ml.	to 20 fl. oz.

Add the adrenaline to the dehydrated alcohol and very cautiously add just sufficient hydrochloric acid to dissolve it; the acid may be conveniently applied by means of a glass rod dipped alternately into the acid and the alcoholic solution, and shaking the mixture after each addition of acid. Dissolve the ephedrine, menthol and eucalyptol in the alcoholic liquid, mix with the castor oil and add sufficient arachis oil to produce the required volume.

It should be recently prepared and **stored** in completely-filled, well-closed bottles and protected from light.

NEBULA ALKALINA COMPOSITA

(Neb. Alk. Co.)

Compound Alkaline Spray

	Metric	*Imperial*
Sodium Bicarbonate	15·0 g.	131¼ gr.
Borax	15·0 g.	131¼ gr.
Phenol	7·5 g.	65½ gr.
Glycerin	250·0 ml.	5 fl. oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the sodium bicarbonate, borax and phenol in 700 millilitres (14 fluid ounces) of distilled water, add the glycerin and sufficient distilled water to produce the required volume.

NEBULA BENZOINI COMPOSITA
(Neb. Benzoin. Co.)

Compound Benzoin Spray

	Metric	*Imperial*
Oil of Pumilio Pine	15 ml.	144 m.
Oil of Eucalyptus	30 ml.	288 m.
Oil of Cassia	15 ml.	144 m.
Menthol	10 g.	87½ gr.
Glycerin	500 ml.	10 fl. oz.
Tincture of Benzoin	to 1000 ml.	to 20 fl. oz.

Dissolve the menthol and the oils in 400 millilitres (8 fluid ounces) of the tincture of benzoin, add the glycerin and sufficient tincture of benzoin to produce the required volume.

In making this preparation the tincture of benzoin may be replaced by tincture of benzoin prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

NEBULA COCAINÆ COMPOSITA
(Neb. Cocain. Co.)

Compound Cocaine Spray

	Metric	*Imperial*
Cocaine	5 g.	43¾ gr.
Compound Menthol and Thymol Spray	to 1000 ml.	to 20 fl. oz.

Dissolve.

NEBULA EPHEDRINÆ COMPOSITA
(Neb. Ephed. Co.)

Compound Ephedrine Spray

	Metric	*Imperial*
Ephedrine	10 g.	87½ gr.
Menthol	20 g.	175 gr.
Camphor	20 g.	175 gr.
Oil of Thyme	20 ml.	192 m.
Light Liquid Paraffin	to 1000 ml.	to 20 fl. oz.

Dissolve the ephedrine, menthol and camphor in the oil of thyme mixed with a portion of the light liquid paraffin, and dilute with sufficient light liquid paraffin to produce the required volume.

NEBULA EUCALYPTI
(Neb. Eucalyp.)
Eucalyptus Spray

	Metric	*Imperial*
Oil of Eucalyptus	50 ml.	1 fl. oz.
Light Liquid Paraffin	to 1000 ml.	to 20 fl. oz.

Mix.

NEBULA EUCALYPTOLIS COMPOSITA
(Neb. Eucalyp. Co.)
Compound Eucalyptol Spray
Synonym—Nebula Thymolis Composita.

	Metric	*Imperial*
Eucalyptol	80 ml.	1 fl. oz. 288 m.
Camphor	20 g.	175 gr.
Menthol	20 g.	175 gr.
Thymol	1 g.	8¾ gr.
Light Liquid Paraffin	to 1000 ml.	to 20 fl. oz.

Dissolve the camphor, menthol and thymol in a portion of the light liquid paraffin, add the eucalyptol and sufficient light liquid paraffin to produce the required volume.

NEBULA GUAIACOLIS ET MENTHOLIS
(Neb. Guaiacol. et Menthol.)
Guaiacol and Menthol Spray

	Metric	*Imperial*
Guaiacol	20 ml.	192 m.
Menthol	40 g.	350 gr.
Light Liquid Paraffin ..	to 1000 ml.	to 20 fl. oz.

Dissolve.

NEBULA HYOSCINÆ COMPOSITA

(Neb. Hyoscin. Co.)

Compound Hyoscine Spray

	Metric	*Imperial*
Hyoscine Hydrobromide	0·57 g.	5 gr.
Cocaine Hydrochloride	9·13 g.	80 gr.
Atropine Sulphate	1·14 g.	10 gr.
Sodium Nitrite	125·0 g.	2½ oz.
Glycerin	250·0 ml.	5 fl. oz.
Solution of Bordeaux B	5·0 ml.	48 m.
Distilled Water	..to 1000·0 ml.	to 20 fl. oz.

Dissolve the solid ingredients in 600 millilitres (12 fluid ounces) of the distilled water; add the glycerin, the solution of bordeaux B and sufficient distilled water to produce the required volume.

NEBULA IODI COMPOSITA

(Neb. Iod. Co.)

Compound Iodine Spray

	Metric	*Imperial*
Iodine	10 g.	87½ gr.
Phenol	5 g.	43¾ gr.
Light Liquid Paraffin	to 1000 ml.	to 20 fl. oz.

Dissolve the iodine in a portion of the light liquid paraffin with the aid of heat, add the phenol and sufficient light liquid paraffin to produce the required volume.

NEBULA IODI ET MENTHOLIS

(Neb. Iod. et Menthol.)

Iodine and Menthol Spray

	Metric	*Imperial*
Iodine	20 g.	175 gr.
Menthol	40 g.	350 gr.
Light Liquid Paraffin	to 1000 ml.	to 20 fl. oz.

Dissolve the iodine in a portion of the light liquid paraffin with the aid of heat, add the menthol while the solution is warm, cool, and add sufficient light liquid paraffin to produce the required volume.

NEBULA MENTHOLIS ET THYMOLIS COMPOSITA

(Neb. Menthol. et Thymol. Co.)

Compound Menthol and Thymol Spray

	Metric	*Imperial*
Menthol	20 g.	175 gr.
Thymol	2 g.	17½ gr.
Camphor	20 g.	175 gr.
Phenol	20 g.	175 gr.
Light Liquid Paraffin	to 1000 ml.	to 20 fl. oz.

Dissolve.

OCULENTA

Ointments for the Eye

Ointments for the eye are prepared with the sterilised basis, Oculentum Simplex, in accordance with the directions of the British Pharmacopœia, unless otherwise ordered. If the medicament is readily soluble in water it should be dissolved in the smallest quantity of sterilised water. This solution should then be incorporated gradually with the melted basis and the mixture triturated continuously until cold. If the medicament is not readily soluble in water it should be finely powdered, thoroughly levigated with a small quantity of the basis and finally incorporated with the remainder. The ointment should be packed in a sterilised container and stored in a cool place. Small collapsible tubes are the best type of container, since there is a much smaller risk of contamination than when a pot is used. When a medicament is in the form of an aqueous solution of an alkaloidal salt emulsified in the basis, the action is exerted much more rapidly and is more powerful than when it is in the form of an alkaloid in solution in the basis, because of the greater ease with which solution in the lachrymal secretion is effected.

OCULENTUM ACIDI BORICI

(Oculent. Acid. Boric.)

Boric Acid Eye Ointment

	Metric	*Imperial*
Boric Acid, in very fine powder ..	4 g.	20 gr.
Simple Eye Ointment	96 g.	480 gr.

Triturate the boric acid with a portion of the melted simple eye ointment until smooth and gradually add the remainder of the melted basis, triturating continuously until the product is cold.

OCULENTUM ATROPINÆ ET COCAINÆ
(Oculent. Atrop. et Cocain.)

Atropine and Cocaine Eye Ointment

	Metric	*Imperial*
Atropine Sulphate	0·25 g.	1¼ gr.
Cocaine Hydrochloride	0·5 g.	2½ gr.
Sterilised Water	a sufficient quantity	
Simple Eye Ointment ..	..to 100·0 g.	to 500 gr.

Dissolve the atropine sulphate and the cocaine hydrochloride in the minimum quantity of sterilised water, gradually add sufficient melted simple eye ointment, cooled to about 50°, to produce the required weight, and triturate continuously until cold.

OCULENTUM FLAVUM
(Oculent. Flav.)

Yellow Eye Ointment

	Metric	*Imperial*
Moist Yellow Mercuric Oxide Ointment	10 g.	50 gr.
Simple Eye Ointment	90 g.	450 gr.

Mix.

OCULENTUM IODOFORMI ET ATROPINÆ
(Oculent. Iodof. et Atrop.)

Iodoform and Atropine Eye Ointment

	Metric	*Imperial*
Iodoform, in fine powder ..	5·0 g.	25 gr.
Atropine Sulphate	0·125 g.	⅛ gr.
Sterilised Water	a sufficient quantity	
Simple Eye Ointment .	.. to 100·0 g.	to 500 gr.

Dissolve the atropine sulphate in the minimum quantity of sterilised water, gradually add sufficient melted simple eye ointment, cooled to about 50°, to produce 95 grammes (475 grains) and triturate continuously until cold; then gradually incorporate the iodoform.

OCULENTUM SIMPLEX
(Oculent. Simp.)

Simple Eye Ointment

	Metric	*Imperial*
Wool Fat	10 g.	50 gr.
Yellow Soft Paraffin	90 g.	450 gr.

Melt together, filter while hot through coarse filter paper and sterilise by heating at 150° for one hour.

It should be **stored** in small, well-closed containers in a cool place.

OLEINATUM QUININÆ
(Oleinat. Quinin.)

Oleinate of Quinine

	Metric	*Imperial*
Quinine	250 g.	4 oz.
Oleic Acid	to 1000 g.	to 16 oz.

Triturate the quinine in a warm mortar with a small quantity of the oleic acid until a smooth paste is formed; then add sufficient warmed oleic acid to produce the required weight, and stir until the quinine is dissolved.

OLEINATUM VERATRINÆ
(Oleinat. Veratrin.)

Oleinate of Veratrine

	Metric	*Imperial*
Veratrine	20 g.	140 gr.
Oleic Acid	500 g.	8 oz.
Olive Oil	to 1000 g.	to 16 oz.

Triturate the veratrine with about 50 millilitres (385 minims) of olive oil, warm gently, add the oleic acid, stir until the veratrine is dissolved, and add sufficient olive oil to produce the required weight.

OLEORESINA CAPSICI
(Oleores. Capsic.)

Oleoresin of Capsicum

Synonyms—Capsicin; Extract of Capsicum.

	Metric	*Imperial*
Capsicum, in moderately coarse powder	1000 g.	16 oz.
Ether	a sufficient quantity	
Alcohol (90 per cent.)	a sufficient quantity	

Exhaust the capsicum by percolation in a continuous extractor with ether. Evaporate off the ether and extract the resulting product with successive quantities of alcohol (90 per cent.) until the insoluble residue is free from pungency. Mix the alcoholic solutions, recover most of the alcohol by distillation and remove the remainder by heating on a water-bath.

It is soluble in ether, benzene, chloroform, fixed oils and fats, and is approximately four times the strength of the oleoresin of the British Pharmaceutical Codex, 1923.

Dose.– 0·0006 to 0·002 gramme ($\frac{1}{100}$ to $\frac{1}{30}$ grain).

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

OLEORESINA CUBEBÆ

(Oleores. Cubeb.)

Oleoresin of Cubeb

	Metric	*Imperial*
Cubeb, in moderately coarse powder	1000 g.	16 oz.
Ether	a sufficient quantity	

Exhaust the cubeb by slow percolation with the ether until the percolate is colourless; recover the ether by distillation, allow the residue to stand in a closed vessel until waxy or crystalline matter ceases to be deposited, and decant the oleoresin.

It should be **stored** in well-stoppered bottles.

Dose.– 0·3 to 2 millilitres (5 to 30 minims).

OLEORESINA ZINGIBERIS

(Oleores. Zingib.)

Oleoresin of Ginger

Synonym—Gingerin.

	Metric	*Imperial*
Ginger, in moderately fine powder	1000 g.	16 oz.
Acetone	a sufficient quantity	

Moisten the ginger with 50 millilitres (7 fluid drachms) of acetone, transfer as quickly as possible to a percolator with a closely fitting cover, pack tightly, and percolate slowly with acetone until exhaustion is complete; evaporate the percolate on a water-bath until it will barely pour.

It should be **stored** in well-stoppered bottles.

Dose.– 0·016 to 0·06 gramme ($\frac{1}{4}$ to 1 grain).

OLEUM CARBOLISATUM
(Ol. Carbol.)

Carbolised Oil

Synonym—Carbolic Oil.

	Metric	*Imperial*
Phenol	50 g.	1 oz.
Arachis Oil	to 1000 ml.	to 20 fl. oz.

Dissolve the phenol in about 900 millilitres (18 fluid ounces) of the arachis oil with the aid of gentle heat, cool, and add sufficient arachis oil to produce the required volume.

OLEUM LUBRICANS
(Ol. Lubric.)

Lubricant Oil

Synonyms—Lund's Oil; Catheter Oil.

	Metric	*Imperial*
Phenol	50 g.	1 oz.
Castor Oil	200 ml.	4 fl. oz.
Arachis Oil	to 1000 ml.	to 20 fl. oz.

Dissolve the phenol in a mixture of the castor oil and about 700 millilitres (14 fluid ounces) of the arachis oil with the aid of gentle heat, cool, and add sufficient arachis oil to produce the required volume.

This preparation was prepared formerly with almond oil instead of arachis oil.

OLEUM PHOSPHORATUM
(Ol. Phosphor.)

Phosphorated Oil

	Metric	*Imperial*
Phosphorus	10 g.	70 gr.
Oil of Lemon	10 g.	70 gr.
Almond Oil	980 g.	15 oz. 297½ gr.

Heat the almond oil to 150°, cool, and filter into a stoppered bottle capable of holding rather more than the required quantity, add the phosphorus, warm to about 80°, shake until it is entirely dissolved, cool, and add the oil of lemon.

Dose.– 0·06 to 0·3 millilitre (1 to 5 minims).

OLEUM RICINI AROMATICUM
(Ol. Ricin. Aromat.)

Aromatic Castor Oil

	Metric	*Imperial*
Saccharin	0·4 g.	3½ gr.
Vanillin	1·1 g.	10 gr.
Chloroform	1·3 ml.	12½ m.
Oil of Cinnamon	2·6 ml.	25 m.
Oil of Pimento	2·6 ml.	25 m.
Oil of Clove	2·6 ml.	25 m.
Castor Oil	to 1000 0 ml.	to 20 fl. oz.

Mix the chloroform with the oils of cinnamon, pimento and clove, add the saccharin and vanillin, dissolve with the aid of gentle heat and mix with the castor oil.

Dose.– 4 to 30 millilitres (1 to 8 fluid drachms).

PARENOL
(Paren.)

Parenol

Synonym—Solid Parenol.

	Metric	*Imperial*
White Soft Paraffin or Yellow Soft Paraffin	650 g.	13 oz.
Wool Fat	150 g.	3 oz.
Distilled Water	200 g.	4 oz.

Melt the soft paraffin and wool fat, pour the mixture into a warm mortar and incorporate gradually the warmed distilled water.

PAROGENUM
(Parogen.)

Parogen

Synonyms—Liquid Parogen; Vasoliment.

	Metric	*Imperial*
Liquid Paraffin	400 ml.	8 fl oz.
Oleic Acid	400 ml.	8 fl. oz.
Ammoniated Alcohol	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	100 ml.	2 fl. oz.

Mix and agitate until a clear solution is obtained.

In making this preparation the ammoniated alcohol may be replaced by ammoniated alcohol prepared with industrial methylated spirit suitably diluted, and the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed

PAROGENUM ICHTHAMMOLIS
(Parogen. Ichtham.)

Ichthammol Parogen

Synonyms—Ichthammol Vasoliment; Ammonium Ichthosulphonate Parogen.

	Metric	*Imperial*
Ichthammol	100 g.	2 oz.
Parogen	to 1000 ml.	to 20 fl. oz.

Mix, allow to stand for a short time, and strain.

PAROGENUM IODI
(Parogen. Iod.)

Iodine Parogen

Synonyms—Iodine Vasoliment; Linimentum Iodi Petrolatum.

	Metric	*Imperial*
Iodine	100 g.	2 oz.
Oleic Acid	400 ml.	8 fl. oz.
Liquid Paraffin	400 ml.	8 fl. oz.
Ammoniated Alcohol	100 ml.	2 fl. oz.

Powder the iodine, triturate with the oleic acid until dissolved, and add the liquid paraffin and the ammoniated alcohol.

In making this preparation the ammoniated alcohol may be replaced by ammoniated alcohol prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

PAROGENUM SALICYLATUM
(Parogen. Salicylat.)

Salicylated Parogen

Synonym—Salicylated Vasoliment.

	Metric	*Imperial*
Salicylic Acid	100 g.	2 oz.
Parogen	to 1000 ml.	to 20 fl. oz.

Powder the salicylic acid, triturate it with about 900 millilitres (18 fluid ounces) of the parogen until dissolved, and add sufficient parogen to produce the required volume.

PASTÆ
Pastes

Pastes are medicated preparations intended for external application. They are usually compounded with a basis of soft paraffin, liquid paraffin, starch and glycerin or water, bassorin paste, or gelatin and glycerin. They are employed principally as antiseptic, caustic, cooling, or soothing dressings in skin affections, and are usually applied with a brush or spread on lint, covered with a layer of absorbent cotton wool, and secured by a bandage or strapping plaster. Pastes prepared with a gelatin and glycerin basis are melted by standing the containers in hot water, and applied to the skin with a brush, the film produced being covered with lint or other suitable protective. Gelatin and glycerin pastes are usually medicated with substances possessing antiseptic or soothing properties, and the medicated films produced by their application are frequently employed for protection and relief in dermatology. Bassorin paste (Linimentum Exsiccans) consists of tragacanth, 5 parts; alcohol (90 per cent.), 10 parts; glycerin, 2 parts; distilled water, to 100 parts. This basis is sometimes used medicated with ichthammol (30 per cent.), boric acid (10 per cent.), chrysarobin (5 per cent.), betanaphthol (5 per cent.), resorcinol (30 per cent.), or salicylic acid (5 per cent.). When such preparations are smeared upon the skin and allowed to dry, a medicated film is produced, which can easily be removed by washing.

PASTA ACIDI STEARICI
(Past. Acid. Stear.)

Stearic Acid Paste

Synonym—Unscented Vanishing Cream.

	Metric	*Imperial*
Stearic Acid	200 g.	4 oz.
Potassium Hydroxide	5 g.	43¾ gr.
Alcohol (90 per cent.)	50 ml.	1 fl. oz.
Borax	15 g.	131¼ gr.
Distilled Water	730 ml.	14 fl. oz. 288 m.

Melt the stearic acid on a water-bath, add the potassium hydroxide dissolved in the alcohol, then add, in one quantity, a boiling solution of the borax in the distilled water, stir thoroughly and allow to stand for twelve hours.

It should be **stored** in well-closed containers.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

PASTA ARSENICALIS

(Past. Arsen.)

Arsenical Paste

	Metric	*Imperial*
Arsenic Trioxide	50 g.	2 oz.
Morphine Hydrochloride ..	25 g.	1 oz.
Creosote	a sufficient quantity	

Mix the arsenic trioxide and the morphine hydrochloride with sufficient creosote to form a stiff paste.

PASTA BISMUTHI

(Past. Bism.)

Bismuth Paste

	Metric	*Imperial*
Bismuth Carbonate	300 g.	6 oz.
White Soft Paraffin	700 g.	14 oz.

Triturate the bismuth carbonate to a smooth paste in a sterilised mortar with the soft paraffin previously sterilised by heating for one hour at 150°, transfer to a flask, and plug the flask by placing a piece of gauze over the mouth and then forcing a pad of cotton wool into the neck; heat on a water-bath for thirty minutes; then cover the mouth of the flask with jaconet, securing the edges of the gauze and jaconet with a strip of plaster, and shake until the paste has set.

PASTA BISMUTHI ET IODOFORMI

(Past. Bism. et Iodof.)

Bismuth and Iodoform Paste

Synonym—B.I.P.P.

	Metric	*Imperial*
Bismuth Subnitrate	250 g.	4 oz.
Iodoform	500 g.	8 oz.
Liquid Paraffin	250 g.	4 oz.

Mix.

PASTA HAMAMELIDIS

(Past. Hamam.)

Hamamelis Paste

Synonym—Witch Hazel Cream.

	Metric	*Imperial*
Stearic Acid	100·0 g.	1 oz. 262½ gr.
Potassium Carbonate	7·5 g.	52½ gr.
Wool Fat	25·0 g.	175 gr.
Liquid Paraffin	15·0 ml.	115½ m.
Glycerin	50·0 g.	350 gr.
Solution of Hamamelis	500·0 ml.	8 fl. oz.
Distilled Water	300·0 ml.	4 fl. oz. 384 m.

Dissolve the potassium carbonate in the distilled water heated nearly to boiling, gradually add the solution to the stearic acid, wool fat and liquid paraffin previously melted together with the aid of gentle heat, and mix. Add the glycerin mixed with the solution of hamamelis and heated to 90°, and stir vigorously until cold.

PASTA ICHTHAMMOLIS

(Past. Ichtham.)

Ichthammol Paste

Synonyms—Ammonium Ichthosulphonate Paste; Gelatinum Ichthammol; Ammonium Ichthosulphonate Jelly.

	Metric	*Imperial*
Ichthammol	100 g.	2 oz.
Gelatin	100 g.	2 oz.
Glycerin	600 g.	12 oz.
Distilled Water	250 ml.	5 fl. oz.

Soak the gelatin in the distilled water until softened and heat on a water-bath until dissolved, replace the water lost by evaporation, add the glycerin and ichthammol, and mix.

PASTA MAGNESII SULPHATIS

(Past. Mag. Sulph.)

Magnesium Sulphate Paste

Synonym—Morison's Paste.

	Metric	*Imperial*
Exsiccated Magnesium Sulphate, dried at 100°	450 g.	7 oz. 87½ gr.
Glycerin	550 g.	8 oz. 350 gr.
Phenol	5 g.	35 gr.

Dissolve the phenol in the glycerin and mix with the exsiccated magnesium sulphate in a warm mortar.

It should be **stored** in well-closed jars or collapsible tubes.

PASTA PICIS CARBONIS

(Past. Pic. Carbon.)

Coal Tar Paste

	Metric	*Imperial*
Coal Tar	34·3 g.	240 gr.
Compound Paste of Zinc Oxide	to 1000·0 g.	to 16 oz.

Mix.

PASTA RESORCINOLIS

(Past. Resorcin.)

Resorcinol Paste

Synonyms—Pasta Resorcini; Resorcin Paste; Lassar's Stronger Resorcin Paste.

	Metric	*Imperial*
Resorcinol	200 g.	4 oz.
Zinc Oxide, finely sifted ..	200 g.	4 oz.
Starch, finely sifted	200 g.	4 oz.
Liquid Paraffin	400 ml.	8 fl. oz.

Reduce the resorcinol to fine powder and mix with the zinc oxide, starch and liquid paraffin.

PASTA RESORCINOLIS MITIS

(Past. Resorcin. Mit.)

Mild Resorcinol Paste

Synonyms—Pasta Resorcini Mitis; Mild Resorcin Paste; Lassar's Mild Resorcin Paste.

	Metric	*Imperial*
Resorcinol	100 g.	1 oz.
Zinc Oxide, finely sifted ..	250 g.	2½ oz.
Starch, finely sifted	250 g.	2½ oz.
Liquid Paraffin	400 ml.	4 fl. oz.

Reduce the resorcinol to fine powder and mix with the zinc oxide, starch and liquid paraffin.

PASTA TRAGACANTHÆ COMPOSITA
(Past. Trag. Co.)
Compound Tragacanth Paste

Synonyms—Pasta Lubricans; Catheter Lubricant.

	Metric	*Imperial*
Tragacanth, in powder	10 g.	87½ gr.
Boric Acid, in powder	30 g.	262½ gr.
Oil of Lavender	5 ml.	48 m.
Glycerin	100 ml.	2 fl. oz.
Decoction of Chondrus	to 1000 ml.	to 20 fl. oz.

Triturate the tragacanth and boric acid with the oil of lavender and glycerin and gradually add the decoction of chondrus. Sterilise by heating in an autoclave or by tyndallisation and transfer to sterile collapsible tubes.

PASTA ZINCI OXIDI CUM ACIDO SALICYLICO
(Past. Zinc. Oxid. c. Acid. Salicyl.)
Paste of Zinc Oxide with Salicylic Acid

Synonym—Lassar's Paste.

	Metric	*Imperial*
Zinc Oxide, finely sifted ..	240 g.	6 oz.
Starch, finely sifted	240 g.	6 oz.
Salicylic Acid, finely sifted ..	20 g.	½ oz.
White Soft Paraffin	500 g.	12½ oz.

Mix.

PASTILLI
Pastilles

Pastilles are soft masses of medicated glycogelatin used for applying medicaments to the throat and mouth. They may be prepared by pouring the liquefied medicated glycogelatin into starch moulds. The pastilles in the moulds are transferred to a warm atmosphere until dry, taken from the moulds, and any adherent starch removed by washing or by rolling the pastilles in a cloth. For small quantities of pastilles the glycogelatin may be melted on a water-bath and the active ingredient, in solution or suspension, incorporated. If insoluble, the medicament

should be triturated with a small portion of the melted glycogelatin or with a little glycerin before mixing with the remainder of the basis. The melted mixture is poured into circular moulds of suitable size or into a suitable tray to solidify and then cut into the required number of pastilles, each of which should measure about two centimetres in diameter and weigh about two grammes. The moulds may be lubricated with almond oil before pouring in the melted mixture. The quantities given in each formula are for one pastille. When the proportion of medicament to be contained in each pastille is not stated by the prescriber, the following quantity should be dispensed:—

Pastilli Ammonii Bromidi.—Ammonium bromide, 0·06 gramme (1 grain).

Pastilli Ammonii Chloridi.—Ammonium chloride, 0·13 gramme (2 grains).

Pastilli Benzaminæ.—Benzamine hydrochloride, 0·03 gramme ($\frac{1}{2}$ grain).

Pastilli Cocainæ Hydrochloridi.—Cocaine hydrochloride, 0 0016 gramme ($\frac{1}{40}$ grain).

Pastilli Codeinæ.—Codeine, 0·008 gramme ($\frac{1}{8}$ grain).

Pastilli Diamorphinæ Hydrochloridi.—Diamorphine hydrochloride, 0·0016 gramme ($\frac{1}{10}$ grain).

Pastilli Eucalyptolis.—Eucalyptol, 0·03 millilitre ($\frac{1}{2}$ minim).

Pastilli Mentholis.—Menthol, 0·003 gramme ($\frac{1}{20}$ grain).

Pastilli Pyrethri.—Pyrethrum root, 0·06 gramme (1 grain).

PASTILLI AMMONII CHLORIDI COMPOSITI

(Pastill. Ammon. Chlorid. Co.)

Compound Ammonium Chloride Pastilles

	Metric	*Imperial*
Ammonium Chloride	0·13 g.	2 gr.
Liquid Extract of Liquorice ..	0·12 ml.	2 m.

PASTILLI DIAMORPHINÆ ET PINI COMPOSITI

(Pastill. Diamorph. et Pini Co.)

Compound Diamorphine and Pine Pastilles

	Metric	*Imperial*
Diamorphine Hydrochloride ..	0·0013 g.	$\frac{1}{45}$ gr.
Oil of Pumilio Pine	0·015 ml.	$\frac{1}{4}$ m.
Terpin Hydrate	0·008 g.	$\frac{1}{8}$ gr.

PASTILLI MENTHOLIS ET COCAINÆ

(Pastill. Menthol. et Cocain.)

Menthol and Cocaine Pastilles

	Metric	*Imperial*
Menthol	0·003 g.	$\frac{1}{20}$ gr.
Cocaine Hydrochloride	0·0016 g.	$\frac{1}{40}$ gr.

PASTILLI MENTHOLIS ET EUCALYPTOLIS

(Pastill. Menthol. et Eucalyp.)

Menthol and Eucalyptol Pastilles

	Metric	*Imperial*
Menthol	0·003 g.	$\frac{1}{20}$ gr.
Eucalyptol	0·03 ml.	$\frac{1}{2}$ m.

PESSI

Pessaries

Pessaries are made by incorporating the requisite quantity of active ingredient, finely powdered if necessary, or dissolved in or mixed with a small quantity of distilled water, with melted oil of theobroma or glycerin suppository basis (Suppositorium Glycerini) and pouring the mixture into moulds capable of holding 8 grammes (120 grains), unless other sizes are ordered. When the proportion of medicament to be contained in each pessary is not stated by the prescriber, the following quantity should be dispensed, and unless otherwise directed, the basis used should be oil of theobroma.

Pessus Acidi Borici.—Boric acid, 0·6 gramme (10 grains).

Pessus Acidi Lactici.—Lactic acid, 0·15 millilitre (2½ minims), in 2 grammes (30 grains) of oil of theobroma.

Pessus Acidi Tannici.—Tannic acid, 0·6 gramme (10 grains).

Pessus Acriflavinæ.—Acriflavine, 0·008 gramme (⅛ grain).

Pessus Aluminis.—Alum, 0·3 gramme (5 grains).

Pessus Ichthammolis.—Ichthammol, 0·6 gramme (10 grains), in glycerin suppository basis.

Pessus Quininæ Hydrochloridi.—Quinine hydrochloride, 0·2 gramme (3 grains), in 2 grammes (30 grains) of oil of theobroma.

Pessus Zinci Sulphatis.—Zinc sulphate, 0·3 gramme (5 grains).

PHENOL CUM CAMPHORA

(Phenol c. Camph.)

Phenol with Camphor

Synonyms—Phenol Camphor; Carbolic Camphor.

	Metric	*Imperial*
Phenol	250 g.	5 oz.
Camphor	750 g.	15 oz.

Triturate together until liquefied.

PHENOL IODISATUM

(Phenol Iodisat.)

Iodised Phenol

Synonym—Iodised Carbolic Acid.

	Metric	*Imperial*
Iodine	100 g.	2 oz.
Liquefied Phenol	to 1000 ml.	to 20 fl. oz.

Dissolve.

PIGMENTA

Paints

Paints are liquid preparations usually medicated with substances possessing antiseptic, caustic, soothing, or stimulating properties. They are prepared with vehicles which render their consistence suitable for application to the skin or mucous surfaces by means of a brush. The character of the bases differs considerably, the selection depending upon the nature of the medicament to be applied, the duration of contact desired, and the degree of absorption required. Caustic substances when employed as paints are usually applied dissolved in distilled water or occasionally in alcoholic or ethereal vehicles. Resinous substances, such as benzoin, storax, balsam of tolu, or sandarac, dissolved in ether, are employed as bases of medicated varnishes, and used for application to the skin and raw mucous surfaces. Bottles fitted with glass stoppers are usually most suitable as containers for paints. Paints containing chromium trioxide are applied by means of glass brushes.

PIGMENTUM ACONITI COMPOSITUM

(Pig. Aconit. Co.)

Compound Aconite Paint

	Metric	*Imperial*
Liniment of Aconite	375 ml.	7½ fl. oz.
Liniment of Belladonna	375 ml.	7½ fl. oz.
Chloroform	125 ml.	2½ fl. oz.
Distilled Water	125 ml.	2½ fl. oz.

Mix.

PIGMENTUM CHLORALIS ET CAMPHORÆ COMPOSITUM

(Pig. Chloral. et Camph. Co.)

Compound Chloral and Camphor Paint

	Metric	*Imperial*
Chloral Hydrate	250 g.	5 oz.
Camphor	250 g.	5 oz.
Phenol	250 g.	5 oz.

Triturate together until liquefied.

PIGMENTUM CHRYSAROBINI

(Pig. Chrysarob.)

Chrysarobin Paint

	Metric	*Imperial*
Chrysarobin	100 g.	2 oz.
Solution of Gutta Percha	.. to 1000 ml.	to 20 fl. oz.

Dissolve.

PIGMENTUM HYDRARGYRI NITRATIS

(Pig. Hydrarg. Nit.)

Mercuric Nitrate Paint

Synonyms—Guttæ Hydrargyri Nitratis; Mercuric Nitrate Drops.

	Metric	*Imperial*
Dilute Ointment of Mercuric Nitrate	62·5 g.	1¼ oz.
Arachis Oil	to 1000·0 ml.	to 20 fl. oz.

Dissolve the ointment in a portion of the arachis oil with the aid of gentle heat, cool, and add sufficient arachis oil to produce the required volume.

PIGMENTUM HYDRARGYRI NITRATIS CUM MENTHOLE

(Pig. Hydrarg. Nit. c. Menthol.)

Mercuric Nitrate Paint with Menthol

	Metric	*Imperial*
Dilute Ointment of Mercuric Nitrate	62·5 g.	1¼ oz.
Menthol	10 0 g.	87½ gr.
Arachis Oil	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the ointment and the menthol in a portion of the arachis oil with the aid of gentle heat, cool, and add sufficient arachis oil to produce the required volume.

PIGMENTUM IODI COMPOSITUM
(Pig. Iod. Co.)

Compound Iodine Paint

Synonym—Mandl's Paint.

	Metric	*Imperial*
Iodine	12·5 g.	¼ oz.
Potassium Iodide	25·0 g.	½ oz.
Distilled Water	25·0 ml.	½ fl. oz.
Oil of Peppermint	7·5 ml.	72 m.
Glycerin	to 1000·0 ml.	to 20 fl. oz.

Dissolve the iodine and potassium iodide in the distilled water, add a portion of the glycerin, the oil of peppermint, and then sufficient glycerin to produce the required volume.

The paint should be well shaken before use.

PIGMENTUM IODI ET ACONITI
(Pig. Iod. et Aconit.)

Iodine and Aconite Paint

	Metric	*Imperial*
Weak Solution of Iodine	500 ml.	10 fl. oz.
Strong Tincture of Aconite	500 ml.	10 fl. oz.

Mix.

In making this preparation the weak solution of iodine and the strong tincture of aconite may be replaced by a weak solution of iodine and a strong tincture of aconite prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

PIGMENTUM IODOFORMI COMPOSITUM
(Pig. Iodof. Co.)

Compound Iodoform Paint

Synonym—Whitehead's Varnish.

	Metric	*Imperial*
Benzoin, coarsely powdered	100 g.	2 oz.
Storax	75 g.	1½ oz.
Balsam of Tolu	50 g.	1 oz.
Iodoform	100 g.	2 oz.
Ether	to 1000 ml.	to 20 fl. oz.

Macerate the benzoin, storax and balsam of tolu with 800 millilitres (16 fluid ounces) of the ether for seven days, frequently agitating; filter, dissolve the iodoform in the filtrate, and pass sufficient of the ether through the filter to produce the required volume.

PIGMENTUM MENTHOLIS ET TOLUENI
(Pig. Menthol. et Toluen.)
Menthol and Toluene Paint

Synonym—Löffler's Paint.

	Metric	*Imperial*
Menthol	100 g.	2 oz.
Dehydrated Alcohol	600 ml.	12 fl. oz.
Strong Solution of Ferric Chloride	10 ml.	96 m.
Toluene	to 1000 ml.	to 20 fl. oz.

Dissolve the menthol in 300 millilitres (6 fluid ounces) of the toluene mixed with the dehydrated alcohol, add the strong solution of ferric chloride and sufficient toluene to produce the required volume.

PIGMENTUM OLEI PICIS CUM IODO
(Pig. Ol. Pic. c. Iod.)
Oil of Tar and Iodine Paint

Synonyms—Pigmentum Picis cum Iodo; Pasta Iodi et Picis; Coster's Paste.

	Metric	*Imperial*
Iodine	200 g.	·4 oz.
Rectified Oil of Tar	800 ml.	16 fl. oz.

Dissolve with the aid of gentle heat, applied cautiously.

PIGMENTUM SALOLIS
(Pig. Salol.)
Salol Paint

	Metric	*Imperial*
Salol	33·3 g.	29½ gr.
Glycerin	200·0 ml.	4 fl. oz.
Alcohol (90 per cent.)	to 1000·0 ml.	to 20 fl. oz.

Dissolve.

PILULÆ
Pills

Pills are prepared from masses of a special consistence made by incorporating medicaments with suitable inert substances, termed excipients. In preparing the pill mass, the medicaments must be

uniformly distributed throughout the mass, potent substances being carefully diluted with the larger quantities of less potent ingredients before massing with the excipient. Small quantities of potent substances may be obtained by making a triturate with lactose as described under Pulveres. The mass should be thoroughly plastic, and sufficiently firm to retain a spherical shape when made into pills. The diameter of pills should rarely be less than $\frac{1}{8}$ inch (about 1 grain in weight) or more than $\frac{1}{4}$ inch (about 5 grains in weight). When the ingredients are liable to change on exposure to air, or are of a volatile, bitter, or nauseous character, the pills should be coated. The coating may consist of varnish, gelatin, sugar, silver leaf, or a pearl coating. When medicaments are required to act in the intestines and not in the stomach, an enteric coating is usually applied.

Excipients.—Excipients vary considerably in their physical characters. They are usually either more or less viscous liquids, powdered gums, absorbent, fibrous, vegetable powders, powdered soap, or chemically inert substances such as kaolin. The choice of the excipient is very important, for the latter should not exert a medicinal action of its own or affect that of the medicaments, neither should it render the mass insoluble, for it is important that the pills should dissolve or disintegrate readily on being swallowed. Any excipient which prevents this must be carefully avoided. When the ingredients of the pills are colourless it is desirable to avoid introducing a coloured excipient; lactose may be employed when a diluent is required, and syrup of liquid glucose as excipient. The following excipients are in general use:—

Syrup of Liquid Glucose forms a very satisfactory general excipient for massing ingredients which contain fibrous matter or, in conjunction with a little powdered gum, for substances which contain no binding material. A mass made with this excipient usually disintegrates readily.

Liquid Glucose may replace syrup of liquid glucose with advantage when greater cohesiveness is wanted. Its viscosity makes it a difficult excipient to manipulate.

Glycerin of Tragacanth requires to be very sparingly used since excess may produce an elastic mass which is difficult to convert into spherical pills.

Powdered Gum, in the form of acacia or tragacanth, or a mixture of equal parts of each, known as compound powder of acacia (Pulvis Acaciæ Compositus), is a valuable addition when there is no binding material in the ingredients. Not more than about 5 per cent. should be added, the pills being massed with syrup of liquid glucose. When too much tragacanth is used an elastic mass may be formed.

Liquorice, in powder, possesses excellent absorbent properties. By virtue of its fibrous nature it is an ideal combination with syrup of liquid glucose for producing a mass. It is also useful for stiffening masses containing soft extracts.

Powdered Soap can be used with advantage to absorb volatile oils, or substances of a similar nature, the mass being subsequently stiffened with powdered liquorice. One minim of oil usually requires 1 grain of powdered curd soap and about 1½ grains of powdered liquorice to stiffen it.

Kaolin, or Diatomite, with wool fat is a useful excipient for substances such as potassium permanganate, potassium dichromate, silver nitrate, etc., which cannot be massed with the usual excipients, but require chemically inert diluents. The medicament should be made into a paste with the minimum quantity of wool fat and then stiffened by the addition of kaolin or diatomite.

The following **scheme for the preparation of pill masses** is of almost general application.

(a) When binding material, such as gum, fibre, or soft or dry aqueous extracts, is present, the ingredients should be massed with syrup of liquid glucose.

(b) When no binding material is present, as in the case of camphor, sulphur, thymol, resins, reduced iron and crystalline substances such as ferrous sulphate, 5 per cent. of compound powder of acacia should be added, and the ingredients massed with syrup of liquid glucose. In certain cases it is advisable to substitute liquid glucose for the syrup, to give greater cohesiveness.

(c) Volatile oils and similar substances should be absorbed in powdered curd soap, and the mass stiffened with powdered liquorice.

(d) Oxidising substances, such as potassium permanganate, should be made into a paste with the minimum amount of wool fat, and the mass stiffened with kaolin or diatomite.

Coatings.—The rapidity with which pills produce effect depends more upon the character of their mass than upon that of the coating with which they are enveloped. The selection of a suitable excipient is of primary importance. It has been shown by experiment that the presence of the coatings in general use does not retard the disintegration of pills to any appreciable extent. If a coating does not dissolve in contact with moisture and warmth, rupture readily ensues through the expansion of the pill, providing the consistence of the latter is plastic and not unduly hard. The practice in vogue in most pharmacies of invariably coating pills, unless otherwise ordered, is advantageous from every point of view. Coated pills are tasteless and elegant in appearance, they are less liable to deteriorate on keeping, and are usually more acceptable to the patient than uncoated pills.

Varnish Coating is in general use, and a solution of sandarac in alcohol (95 per cent.) (1 in 2) or equal volumes of alcohol (95 per cent.) and ether is commonly employed. About 5 to 8 drops of the solution suffice to coat one dozen 5 grain pills. The pills should be shaken from the varnishing pot on to a slab previously smeared with a small quantity of oil, and allowed to dry.

Silver Leaf provides an elegant coating for pills, which should be firm in consistence and have a well-polished surface free from powder. About two leaves should be sufficient for twelve 5 grain pills. The pills are first made tacky with dilute mucilage of acacia, and then rotated in the silver leaf in a warm, dry, porcelain pot. Silver coating should not be used for pills containing substances liable to affect it, such as sulphides, unless they are previously varnished.

Sugar Coating can only be applied satisfactorily to large quantities of pills by machinery adapted for the purpose. When a sweetened pill coating is required at the dispensing counter, it is customary to use purified talc containing 2 per cent. of soluble saccharin or a small percentage of sugar.

Gelatin Coating, particularly if applied by machinery, provides elegant and satisfactory results. For coating on a small scale, the pills may be impaled on needles and then dipped in thin, melted gelatin solution. They should then be set aside to dry in such a manner that excess of the gelatin solution can drain down the needles. A suitable gelatin solution may be prepared from the following formula:—gelatin, 1 part, mucilage of acacia, 1 part, saturated solution of boric acid, to 10 parts.

Pearl Coating, unlike sugar coating, can be carried out at the dispensing counter. It consists in building up successive layers of purified talc on the pills with the aid of mucilage. The pills should preferably be fairly hard. Elegant results depend to some extent upon practice, and more especially upon the application of a suitable amount of adhesive solution to the pill previous to coating. The following method has proved satisfactory in practice:—Varnish the pills with a sandarac varnish, and transfer while still wet to a covered pot containing a small quantity of purified talc which may be sweetened with soluble saccharin. Rotate five or six times, and transfer the pills to a pill rounder; remove any superfluous talc by rotating and rubbing the pills on the rounder with demy paper; place a few drops (about 4 drops for each dozen 5 grain pills) of pill-coating mucilage (mucilage of acacia, 1 part, syrup, 1 part, distilled water, 4 parts) in a dry, covered pot; add the pills; rotate a few times, and transfer to another pot (concave within) containing a small quantity of purified talc; rotate gently and not too rapidly for about ten to fifteen seconds; transfer to an inverted lid, and rotate gently for a minute; set aside to dry for at least fifteen minutes, and finish by rotating the pills in a dry pot (concave within) until they have a uniform and polished appearance. The process, excluding the quarter of an hour during which the pills are set aside, usually occupies less than ten minutes if the requisite materials are ready to hand.

Enteric Coatings are employed for covering pills which are intended to pass through the stomach and act in the intestines. When the medicament is such that it may be inactivated in the stomach, or depends for its efficient action on being released in the intestines in a

concentrated form, the efficiency of the coating is of great importance. The efficiency may be tested by immersing the pills in a dilute solution of hydrochloric acid and pepsin at 37° for two hours with occasional shaking, and then under similar conditions in an alkaline pancreatin solution. The pills should not disintegrate in the former, but should do so in the latter solution. The efficiency of the coating may be destroyed if it should crack owing to the expansion of the pill mass at body temperature. Salol coatings are very liable to do this. Enteric coatings in general use are:—

Formaldehyde-Gelatin or Glutoid Coating. The pills are gelatin coated, allowed to dry, then immersed in a solution of formaldehyde (2 per cent. H·CHO) for fifteen minutes, and dried. This coating is usually satisfactory and rarely cracks.

Stearic Acid. This may be applied by rotating the pills in a little melted stearic acid in a round-bottomed flask for a few seconds, and then jerking the pills out on a large sheet of paper so that they roll sufficiently far for the coating to set. The pills may then be returned to the flask, and the operation quickly repeated. In this manner any desired thickness of coating may be applied. The stearic acid in the flask should be kept just above its melting-point except for the first coating, when it is an advantage to have it at a somewhat higher temperature and therefore much thinner. When the pill mass is of a non-greasy character, it is advisable to moisten the pills with a solution of white wax in ether, allowing the latter to evaporate. Unless this is done, the coating tends to crack readily and peel off.

Salol Coating. This may be applied in the same manner as stearic acid. Non-greasy pill masses should be similarly waxed before coating, otherwise the salol will not adhere.

Keratin Coating. The pills are moistened by rotation in a pot with a 10 per cent. solution of keratin in equal parts of alcohol and strong solution of ammonia, and then shaken out on to an oiled tile to dry. The operation is generally repeated several times, and three or four coatings applied. When the pill mass is of a non-greasy character it should be waxed as in stearic acid coating.

PILULÆ ALOES ET MYRRHÆ

(Pil. Aloes et Myrrh.)

Aloes and Myrrh Pills

Synonyms—Pilulæ Rufi; Rufus Pills.

	Metric	*Imperial*
Aloes, in fine powder	1·56 g.	24 gr.
Myrrh	0·78 g.	12 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ ALOES ET NUCIS VOMICÆ

(Pil. Aloes et Nuc. Vom.)

Aloes and Nux Vomica Pills

	Metric	*Imperial*
Aloes, in fine powder	1·56 g.	24 gr.
Dry Extract of Nux Vomica ..	0·19 g.	3 gr.
Dry Extract of Belladonna ..	0·13 g.	2 gr.
Alcohol (60 per cent.)	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 pill.

PILULÆ ALOINI COMPOSITÆ

(Pil. Aloin. Co.)

Compound Aloin Pills

Synonym—Andrew Clark's Liver Pills.

	Metric	*Imperial*
Aloin	0·39 g.	6 gr.
Dry Extract of Nux Vomica ..	0·39 g.	6 gr.
Exsiccated Ferrous Sulphate ..	0·39 g.	6 gr.
Myrrh	0·39 g.	6 gr.
Hard Soap, in fine powder ..	0·39 g.	6 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 pill.

PILULÆ ALOINI ET PODOPHYLLINI COMPOSITÆ

(Pil. Aloin. et Podoph. Co.)

Compound Aloin and Podophyllin Pills

	Metric	*Imperial*
Aloin	0·32 g.	5 gr.
Oleoresin of Capsicum	0·03 g.	½ gr.
Jalap Resin	0·32 g.	5 gr.
Resin of Podophyllum	0·49 g.	7½ gr.
Dry Extract of Nux Vomica ..	0·16 g.	2½ gr.
Dry Extract of Hyoscyamus ..	0·16 g.	2½ gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 50 pills.

Dose.– 1 to 4 pills.

PILULÆ ALOINI ET STRYCHNINÆ COMPOSITÆ
(Pil. Aloin. et Strych. Co.)

Compound Aloin and Strychnine Pills

	Metric	*Imperial*
Aloin	0·65 g.	10 gr.
Strychnine	0·065 g.	1 gr.
Dry Extract of Belladonna	0·32 g.	5 gr.
Powdered Ipecacuanha	0·16 g.	2½ gr.
Syrup of Liquid Glucose	a sufficient quantity	

Mix to form a mass and divide into 50 pills.

Dose.– 1 or 2 pills.

PILULÆ ASAFŒTIDÆ
(Pil. Asafœt.)

Asafetida Pills

	Metric	*Imperial*
Asafetida	2·33 g.	36 gr.
Hard Soap, in fine powder	0·58 g.	9 gr.
Distilled Water	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ ASIATICÆ
(Pil. Asiatic.)

Asiatic Pills

	Metric	*Imperial*
Arsenic Trioxide	0·065 g.	1 gr.
Black Pepper, in fine powder	0·58 g.	9 gr.
Extract of Gentian	0·13 g.	2 gr.

Mix to form a mass and divide into 12 pills.

Dose.– 1 pill.

PILULÆ CASCARÆ COMPOSITÆ
(Pil. Casc. Co.)

Compound Cascara Pills

Synonym—Pilulæ Cascaræ, Belladonnæ et Nucis Vomicæ.

	Metric	*Imperial*
Dry Extract of Cascara Sagrada	2·59 g.	40 gr.
Dry Extract of Nux Vomica	0·32 g.	5 gr.
Dry Extract of Belladonna	0·32 g.	5 gr.
Syrup of Liquid Glucose	a sufficient quantity	

Mix to form a mass and divide into 50 pills.

Dose.– 1 to 3 pills.

PILULÆ COLCHICI ET ALOES
(Pil. Colch. et Aloes)

Colchicum and Aloes Pills

	Metric	*Imperial*
Dry Extract of Colchicum ..	0·19 g.	3 gr.
Aloes, in fine powder	0·19 g.	3 gr.
Dry Extract of Hyoscyamus ..	0·19 g.	3 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 to 4 pills.

PILULÆ COLCHICI ET HYDRARGYRI
(Pil. Colch. et Hydrarg.)

Colchicum and Mercury Pills

	Metric	*Imperial*
Dry Extract of Colchicum ..	0·13 g.	2 gr.
Pill of Mercury	0·26 g.	4 gr.
Compound Extract of Colocynth	0·39 g.	6 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 to 3 pills.

PILULÆ COLCHICI ET HYDRARGYRI COMPOSITÆ
(Pil. Colch. et Hydrarg. Co.)

Compound Colchicum and Mercury Pills

Synonym—Brodie's Gout Pills.

	Metric	*Imperial*
Dry Extract of Colchicum ..	0·39 g.	6 gr.
Pill of Mercury	1·04 g.	16 gr.
Compound Extract of Colocynth	1·04 g.	16 gr.
Extract of Rhubarb	1·04 g.	16 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ COLOCYNTHIDIS COMPOSITÆ
(Pil. Colocynth. Co.)

Compound Pills of Colocynth

Synonym—Pil. Cochia.

	Metric	*Imperial*
Colocynth, in fine powder ..	0·52 g.	8 gr.
Aloes, in fine powder	1·04 g.	16 gr.
Scammony Resin, in fine powder	1·04 g.	16 gr.
Curd Soap, in fine powder ..	0·26 g.	4 gr.
Oil of Clove	0·15 ml.	2½ m.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ COLOCYNTHIDIS ET HYDRARGYRI
(Pil. Colocynth. et Hydrarg.)

Colocynth and Mercury Pills

Synonym—Abernethy's Pills.

	Metric	*Imperial*
Compound Extract of Colocynth	1·56 g.	24 gr.
Pill of Mercury	2·33 g.	36 gr.

Mix to form a mass and divide into 12 pills.

Dose. – 1 or 2 pills.

PILULÆ COLOCYNTHIDIS ET HYDRARGYRI COMPOSITÆ
(Pil. Colocynth. et Hydrarg. Co.)

Compound Colocynth and Mercury Pills

	Metric	*Imperial*
Pill of Colocynth and Hyoscyamus	0·58 g.	9 gr.
Pill of Mercury	0·19 g.	3 gr.

Mix to form a mass and divide into 12 pills.

Dose.– 1 to 4 pills.

PILULÆ DAMIANÆ COMPOSITÆ
(Pil. Damian. Co.)

Compound Damiana Pills

	Metric	*Imperial*
Extract of Damiana	6·48 g.	100 gr.
Dry Extract of Nux Vomica ..	0·32 g.	5 gr.
Phosphorated Suet	0·32 g.	5 gr.
Chloroform	0·59 ml.	10 m.
Compound Powder of Tragacanth	0·32 g.	5 gr.
Mucilage of Acacia	a sufficient quantity	

Mix quickly the phosphorated suet, extract of damiana, dry extract of nux vomica and chloroform, then add the compound powder of tragacanth and sufficient mucilage of acacia to form a mass. Divide into 50 pills and varnish.

Dose.– 1 pill.

PILULÆ DIGITALIS COMPOSITÆ
(Pil. Digit. Co.)

Compound Digitalis Pills

Synonyms—Pilulæ Digitalis cum Scilla; Guy's Pills; Niemeyer's Pills.

	Metric	*Imperial*
Powdered Digitalis	0·78 g.	12 gr.
Squill, in powder	0·78 g.	12 gr.
Pill of Mercury	0·78 g.	12 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ FERRI CARBONATIS COMPOSITÆ
(Pil. Ferr. Carb. Co.)

Compound Iron Carbonate Pills

Synonym—Blaud's Pill with Aloin and Cascara.

	Metric	*Imperial*
Aloin	0·16 g.	2½ gr.
Dry Extract of Cascara Sagrada	0·81 g.	12½ gr.
Exsiccated Sodium Carbonate ..	1·75 g.	27 gr.
Exsiccated Ferrous Sulphate ..	2·75 g.	42½ gr.
Tragacanth, in powder	0·16 g.	2½ gr.
Acacia, in powder	0·68 g.	10½ gr.
Liquid Glucose	2·59 g.	40 gr.
Distilled Water	0·45 ml.	7½ m.

Mix the aloin, dry extract of cascara sagrada and exsiccated sodium carbonate, add to the previously mixed liquid glucose, distilled water and exsiccated ferrous sulphate, and set aside for ten minutes or until the reaction is complete; add the tragacanth and acacia, mix to form a mass and divide into 25 pills.

Dose.– 1 to 3 pills.

PILULÆ FERRI CARBONATIS CUM ARSENO ET STRYCHNINA

(Pil. Ferr. Carb. c. Arsen. et Strych.)

Pills of Iron Carbonate with Arsenic and Strychnine

Synonym—Blaud's Pills with Arsenic and Strychnine.

	Metric	*Imperial*
Arsenic Trioxide	0·065 g.	1 gr.
Strychnine Hydrochloride ..	0·065 g.	1 gr.
Exsiccated Sodium Carbonate ..	7·00 g.	108 gr.
Exsiccated Ferrous Sulphate ..	11·02 g.	170 gr.
Tragacanth, in powder	0·65 g.	10 gr.
Acacia, in powder	2·72 g.	42 gr.
Liquid Glucose	10·37 g.	160 gr.
Distilled Water	0·59 ml.	10 m.

Triturate the arsenic trioxide and strychnine hydrochloride with a small quantity of the exsiccated sodium carbonate, and gradually add the remainder, triturating thoroughly; add the resulting powder to the previously mixed liquid glucose, distilled water and exsiccated ferrous sulphate, and set aside for ten minutes or until the reaction is complete; add the tragacanth and acacia, mix to form a mass and divide into 100 pills.

Dose.– 1 or 2 pills.

PILULÆ FERRI CARBONATIS ET ARSENI

(Pil. Ferr. Carb. et Arsen.)

Pills of Iron Carbonate and Arsenic

Synonym—Blaud's Pills with Arsenic.

	Metric	*Imperial*
Arsenic Trioxide	0·065 g.	1 gr.
Exsiccated Sodium Carbonate ..	3·50 g.	54 gr.
Exsiccated Ferrous Sulphate ..	5·51 g.	85 gr.
Tragacanth, in powder	0·32 g.	5 gr.
Acacia, in powder	1·36 g.	21 gr.
Liquid Glucose	5·18 g.	80 gr.
Distilled Water	0·30 ml.	5 m.

Triturate the arsenic trioxide with a small quantity of the exsiccated sodium carbonate and gradually add the remainder, triturating thoroughly; add the resulting powder to the previously mixed liquid glucose, distilled water and exsiccated ferrous sulphate, and set aside for ten minutes or until the reaction is complete; add the tragacanth and acacia, mix to form a mass and divide into 50 pills.

Dose.– 1 pill.

PILULÆ FERRI CARBONATIS SACCHARATI
(Pil. Ferr. Carb. Sacch.)

Saccharated Ferrous Carbonate Pills

	Metric	*Imperial*
Saccharated Ferrous Carbonate	2·33 g.	36 gr.
Liquorice, in fine powder ..	0·58 g.	9 gr.
Liquid Glucose	0·78 g.	12 gr.
Distilled Water	0·18 ml.	3 m.

Mix to form a mass and divide into 12 pills.

Dose.– 1 to 3 pills.

PILULÆ FERRI ET ARSENI
(Pil. Ferr. et Arsen.)

Iron and Arsenic Pills

Synonym—Pilulæ Ferri Arsenicales.

	Metric	*Imperial*
Exsiccated Ferrous Sulphate ..	2·33 g.	36 gr.
Arsenic Trioxide	0·013 g.	$\frac{1}{5}$ gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ FERRI PHOSPHATIS CUM QUININA ET STRYCHNINA
(Pil. Ferr. Phosph. c. Quinin. et Strych.)

Iron Phosphate Pills with Quinine and Strychnine

Synonyms—Pilulæ Trium Phosphatum; Easton's Pills; Pilulæ Ferri et Quininæ et Strychninæ Phosphatum.

	Metric	*Imperial*
Saccharated Iron Phosphate ..	0·91 g.	14 gr.
Quinine Sulphate	0·32 g.	5 gr.
Strychnine Hydrochloride ..	0·0065 g.	$\frac{1}{10}$ gr.
Lactose	a sufficient quantity	
Phosphoric Acid	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ FERRI VALERIANATIS COMPOSITÆ

(Pil. Ferr. Valer. Co.)

Compound Iron Valerianate Pills

Synonym—Pilulæ Trium Valerianatum.

	Metric	*Imperial*
Iron Valerianate	0·78 g.	12 gr.
Quinine Valerianate	0·78 g.	12 gr.
Zinc Valerianate	0·78 g.	12 gr.
Compound Powder of Acacia ..	0·13 g.	2 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ GALBANI COMPOSITÆ

(Pil. Galban. Co.)

Compound Pills of Galbanum

Synonym—Compound Pills of Asafetida.

	Metric	*Imperial*
Asafetida	0·78 g.	12 gr.
Galbanum	0·78 g.	12 gr.
Myrrh	0·78 g.	12 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix in a warm mortar to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ HYDRARGYRI CUM CRETA ET OPII

(Pil. Hydrarg. c. Cret. et Opii)

Mercury with Chalk and Opium Pills

Synonym—Hutchinson's Pills.

	Metric	*Imperial*
Mercury with Chalk	0·78 g.	12 gr.
Powder of Ipecacuanha and Opium	0·78 g.	12 gr.
Compound Powder of Acacia ..	0·06 g.	1 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 pill.

PILULÆ HYDRARGYRI CUM RHEO
(Pil. Hydrarg. c. Rheo)

Mercury Pills with Rhubarb

	Metric	*Imperial*
Pill of Mercury	1·94 g.	30 gr.
Compound Pill of Rhubarb ..	1·94 g.	30 gr.

Mix to form a mass and divide into 12 pills.

Dose.– 1 pill.

PILULÆ HYDRARGYRI SUBCHLORIDI, COLOCYNTHIDIS ET HYOSCYAMI
(Pil. Hydrarg. Subchlor. Colocynth. et Hyoscy.)

Mercurous Chloride, Colocynth and Hyoscyamus Pills

Synonyms—Calomel, Colocynth and Hyoscyamus Pills; Zittmann's Pills.

	Metric	*Imperial*
Mercurous Chloride	0·78 g.	12 gr.
Compound Extract of Colocynth	1·94 g.	30 gr.
Dry Extract of Hyoscyamus ..	0·78 g.	12 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ HYDRARGYRI SUBCHLORIDI COMPOSITÆ
(Pil. Hydrarg. Subchlor. Co.)

Compound Mercurous Chloride Pills

Synonyms—Compound Calomel Pills; Plummer's Pills.

	Metric	*Imperial*
Mercurous Chloride	0·78 g.	12 gr.
Sulphurated Antimony	0·78 g.	12 gr.
Guaiacum Resin	1·56 g.	24 gr.
Acacia, in powder	0·039 g.	$\frac{3}{5}$ gr.
Tragacanth, in powder	0·039 g.	$\frac{3}{5}$ gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ HYDRARGYRI SUBCHLORIDI ET COLOCYNTHIDIS

(Pil. Hydrarg. Subchlor. et Colocynth.)

Mercurous Chloride and Colocynth Pills

Synonym—Calomel and Colocynth Pills.

	Metric	*Imperial*
Mercurous Chloride	0·78 g.	12 gr.
Compound Extract of Colocynth	3·12 g.	48 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 pill.

PILULÆ IPECACUANHÆ CUM SCILLA

(Pil. Ipecac. c. Scill.)

Ipecacuanha Pills with Squill

	Metric	*Imperial*
Powder of Ipecacuanha and Opium	1·56 g.	24 gr.
Squill, in powder	0·52 g.	8 gr.
Ammoniacum	0·52 g.	8 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ OVOLECITHINI

(Pil. Ovolecithin.)

Ovolecithin Pills

Synonyms—Pilulæ Lecithini; Lecithin Pills.

	Metric	*Imperial*
Ovolecithin	1·17 g.	18 gr.
Strychnine Hydrochloride ..	0·013 g.	$\frac{1}{5}$ gr.
Althæa, in powder	0·78 g.	12 gr.
Liquorice, in fine powder ..	0·78 g.	12 gr.
Acacia, in powder	0·39 g.	6 gr.
Alcohol (90 per cent.)	a sufficient quantity	
Glycerin	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 to 4 pills.

PILULÆ PHENOLPHTHALEINI COMPOSITÆ
(Pil. Phenolphthal. Co.)

Compound Phenolphthalein Pills

Synonym—Pilulæ Phenaloini.

	Metric	*Imperial*
Aloin	0·19 g.	3 gr.
Phenolphthalein	0·39 g.	6 gr.
Strychnine	0·0097 g.	$\frac{3}{20}$ gr.
Dry Extract of Belladonna	0·06 g.	1 gr.
Powdered Ipecacuanha	0·05 g.	$\frac{4}{5}$ gr.
Syrup of Liquid Glucose	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ PHOSPHORI
(Pil. Phosphor.)

Phosphorus Pills

	Metric	*Imperial*
Phosphorus	0·032 g.	$\frac{1}{2}$ gr.
Oil of Theobroma	1·28 g.	20 gr.
Wool Fat	0·352 g.	$5\frac{1}{2}$ gr.
Kaolin	0·512 g.	8 gr.
Exsiccated Sodium Sulphate	1·024 g.	16 gr.
Carbon Disulphide	0·64 ml.	11 m.

Dissolve the phosphorus and 0·64 gramme (10 grains) of the oil of theobroma in the carbon disulphide. Allow the solution to evaporate in a mortar until a pasty mass is obtained. To this add the remainder of the oil of theobroma together with the other ingredients, mix to form a mass and divide into 50 pills.

The pills should be freshly prepared.

Dose.– 1 to 4 pills.

PILULÆ PLUMBI CUM OPIO
(Pil. Plumb. c. Opio)

Lead Pills with Opium

	Metric	*Imperial*
Lead Acetate, in powder	2·60 g.	40 gr.
Powdered Opium	0·39 g.	6 gr.
Syrup of Liquid Glucose	a sufficient quantity	

Mix to form a mass and divide into 25 pills.

Dose.– 1 or 2 pills.

PILULÆ PODOPHYLLINI, BELLADONNÆ ET NUCIS VOMICÆ

(Pil. Podoph. Bellad. et Nuc. Vom.)

Podophyllin, Belladonna and Nux Vomica Pills

	Metric	*Imperial*
Resin of Podophyllum	0·26 g.	4 gr.
Dry Extract of Belladonna ..	0·26 g.	4 gr.
Dry Extract of Nux Vomica ..	0·26 g.	4 gr.
Aloes, in fine powder	0·78 g.	12 gr.
Distilled Water	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ PODOPHYLLINI COMPOSITÆ

(Pil. Podoph. Co.)

Compound Podophyllin Pills

	Metric	*Imperial*
Resin of Podophyllum	0·19 g.	3 gr.
Mercurous Chloride	0·78 g.	12 gr.
Dry Extract of Belladonna ..	0·13 g.	2 gr.
Tragacanth, in powder	0·13 g.	2 gr.
Lactose, in powder	0·39 g.	6 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 pill.

PILULÆ PODOPHYLLINI ET QUININÆ

(Pil. Podoph. et Quinin.)

Podophyllin and Quinine Pills

Synonym—Poore's Pills.

	Metric	*Imperial*
Resin of Podophyllum	0·06 g.	1 gr.
Quinine Sulphate	0·78 g.	12 gr.
Dry Extract of Belladonna ..	0·10 g.	1½ gr.
Aloes, in fine powder	0·78 g.	12 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 pill.

PILULÆ QUININÆ SULPHATIS
(Pil. Quinin. Sulph.)

Quinine Sulphate Pills

Synonyms—Pilulæ Quininæ; Quinine Pills.

	Metric	*Imperial*
Quinine Sulphate	3·24 g.	50 gr.
Acacia, in powder	0·32 g.	5 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 25 pills.

Dose.– 1 to 4 pills.

PILULÆ SAPONIS CUM OPIO
(Pil. Sap. c. Opio)

Soap Pills with Opium

Synonyms—Pilulæ Saponis Compositæ; Compound Soap Pills.

	Metric	*Imperial*
Powdered Opium	0·65 g.	10 gr.
Hard Soap, in powder ..	1·95 g.	30 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 25 pills.

Dose.– 1 or 2 pills.

PILULÆ SCAMMONIÆ COMPOSITÆ
(Pil. Scammon. Co.)

Compound Scammony Pills

	Metric	*Imperial*
Scammony Resin, in fine powder	0·78 g.	12 gr.
Jalap Resin, in fine powder ..	0 78 g.	12 gr.
Curd Soap, in fine powder ..	0·78 g.	12 gr.
Ginger, in fine powder	0·26 g.	4 gr.
Alcohol (60 per cent.)	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 or 2 pills.

PILULÆ SCILLÆ COMPOSITÆ
(Pil. Scill. Co.)

Compound Squill Pills

	Metric	*Imperial*
Squill, in powder	0·78 g.	12 gr.
Ginger, in fine powder	0·624 g.	9⅔ gr.
Ammoniacum	0·624 g.	9⅔ gr.
Hard Soap, in powder	0·468 g.	7⅕ gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose – 1 or 2 pills.

PILULÆ ZINCI OXIDI ET BELLADONNÆ
(Pil. Zinc. Oxid. et Bellad.)

Zinc Oxide and Belladonna Pills

	Metric	*Imperial*
Zinc Oxide	1·56 g.	24 gr.
Dry Extract of Belladonna ..	0·19 g.	3 gr.
Lactose	0·39 g.	6 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	

Mix to form a mass and divide into 12 pills.

Dose.– 1 pill.

POTUS IMPERIALIS
(Potus Imperial.)

Imperial Drink

Synonym—Haustus Imperialis.

	Metric	*Imperial*
Potassium Acid Tartrate ..	4·6 g.	40 gr.
Citric Acid	0·8 g.	7 gr.
Sucrose	50·0 g.	1 oz.
Oil of Lemon	0·3 ml.	3 m.
Tincture of Lemon	5·2 ml.	50 m.
Distilled Water	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the potassium acid tartrate, citric acid and sucrose in 900 millilitres (18 fluid ounces) of boiling distilled water; allow to cool, add the oil of lemon previously dissolved in the tincture of lemon, and then sufficient distilled water to produce the required volume.

PULVERES
Powders

Powders are usually mixtures of two or more powdered substances and may be for either internal or external use. They may be prepared by mixing the ingredient, or ingredients, ordered in smallest quantity with gradually increasing quantities of the remaining material. For dispensing purposes this is commonly accomplished by light trituration in a mortar, but small quantities may be mixed more conveniently on paper by means of a spatula. Powders intended for direct application externally, and also many powders for internal use, particularly those containing coloured ingredients, should, after mixing, be passed through a sieve of suitable mesh, usually a No. 60; they should then again be triturated lightly, since partial separation of the constituents may have occurred. On a large scale, mixing machines may be used. Before mixing, all solid ingredients should be finely powdered, and in some cases it is customary to employ the powdered drugs in general use without reference to a particular degree of comminution.

When the quantity of an ingredient required is less than 1 grain, or is such that it cannot conveniently be weighed on ordinary dispensing scales, a suitable trituration is prepared by admixture with lactose, and a proportionately larger quantity of the trituration is weighed. If, for example, $\frac{3}{25}$ grain of atropine sulphate is required for the total number of powders ordered, 1 grain of the sulphate is triturated with 24 grains of lactose, and of this mixture 3 grains ($\frac{3}{25}$ grain of atropine sulphate) is used. When a small quantity of a potent ingredient is ordered by itself in a powder, the weight of each powder should be increased to 2 grains by the addition of lactose. If any of the constituents are deliquescent or volatile, the powder should be doubly wrapped, the inner wrapper consisting of waxed or parchment paper; in extreme cases the wrapped powder may finally be enclosed in tin-foil.

The degree of comminution of vegetable drugs used in the manufacture of pharmaceutical preparations is expressed in the following terms:—

A **coarse** powder is one of which all the particles pass through a No. 10 sieve, and not more than 40 per cent. through a No. 44 sieve.

A **moderately coarse** powder is one of which all the particles pass through a No. 22 sieve, and not more than 40 per cent. through a No. 60 sieve.

A **moderately fine** powder is one of which all the particles pass through a No. 44 sieve, and not more than 40 per cent. through a No. 85 sieve.

A **fine** powder is one of which all the particles pass through a No. 85 sieve.

A **very fine** powder is one of which all the particles pass through a silk sieve containing in each direction, parallel to the threads, not less than 120 meshes per inch.

PULVIS ACETANILIDI COMPOSITUS
(Pulv. Acetanilid. Co.)

Compound Acetanilide Powder

	Metric	*Imperial*
Acetanilide, in powder	700 g.	11 oz. 87½ gr.
Caffeine, in powder	100 g.	1 oz. 262½ gr.
Sodium Bicarbonate	200 g.	3 oz. 87½ gr.

Mix.

Dose.– 0·2 to 0·3 gramme (3 to 5 grains).

PULVIS ACIDI BORICI ET AMYLI
(Pulv. Acid. Boric. et Amyli)

Boric Acid and Starch Powder

	Metric	*Imperial*
Boric Acid, in powder	500 g.	8 oz.
Starch, in powder	500 g.	8 oz.

Sift and mix.

PULVIS ACIDI SALICYLICI COMPOSITUS
(Pulv. Acid. Salicyl. Co.)

Compound Salicylic Acid Powder

Synonym—Pulvis pro Pedibus.

	Metric	*Imperial*
Salicylic Acid, in powder ..	30 g.	210 gr.
Boric Acid, in powder ..	100 g.	1 oz. 262½ gr.
Purified Talc, in powder ..	870 g.	13 oz. 402½ gr.

Sift and mix.

PULVIS ALOES ET CANELLÆ
(Pulv. Aloes et Canell.)

Aloes and Canella Powder

Synonym—Hiera Picra.

	Metric	*Imperial*
Aloes, finely powdered	800 g.	12 oz. 350 gr.
Canella, finely powdered ..	200 g.	3 oz. 87½ gr.

Mix.

Dose.– 0·2 to 0·6 gramme (3 to 10 grains).

PULVIS AMYGDALÆ COMPOSITUS
(Pulv. Amygdal. Co.)
Compound Powder of Almond

	Metric	*Imperial*
Sweet Almond	600 g.	9 oz. 262½ gr.
Sucrose, in powder	300 g.	4 oz. 350 gr.
Acacia, in powder	100 g.	1 oz. 262½ gr.

Blanch, dry and reduce the almond to a coarse powder; mix the acacia with the sucrose, add to the powdered almond, and mix.

PULVIS ANTIMONIALIS
(Pulv. Antim.)
Antimonial Powder

	Metric	*Imperial*
Antimonious Oxide	250 g.	5 oz.
Calcium Phosphate	500 g.	10 oz.

Mix.

Dose.– 0·2 to 0·4 gramme (3 to 6 grains).

PULVIS BARII SULPHATIS COMPOSITUS
(Pulv. Barii Sulphatis Co.)
Compound Powder of Barium Sulphate

Synonyms—Barium Meal; Shadow Meal.

	Metric	*Imperial*
Barium Sulphate	750 g.	12 oz.
Cocoa Powder	94 g.	1½ oz.
Arrowroot	94 g.	1½ oz.
Compound Powder of Tragacanth	31 g.	½ oz.
Sucrose, in powder	31 g.	½ oz.

Mix.

Dose.– 120 to 240 grammes (4 to 8 ounces), mixed immediately before use with a sufficient quantity of boiling water poured directly on to the powder.

PULVIS BISMUTHI COMPOSITUS
(Pulv. Bism. Co.)

Compound Bismuth Powder

	Metric	*Imperial*
Bismuth Carbonate	100 g.	2 oz.
Calcium Carbonate	300 g.	6 oz.
Heavy Magnesium Carbonate ..	300 g.	6 oz.
Sodium Bicarbonate	100 g.	2 oz.

Mix.

Dose.– 1 to 4 grammes ($\frac{1}{4}$ to 1 drachm).

PULVIS BORACIS COMPOSITUS
(Pulv. Borac. Co.)

Compound Borax Powder

Synonyms—Pulvis Alkalinus Compositus; Compound Alkaline Powder.

	Metric	*Imperial*
Sodium Bicarbonate	300 g.	4 oz.
Sodium Chloride, in powder ..	300 g.	4 oz.
Borax, in powder	300 g.	4 oz.

Mix.

Use.– For a nasal wash, 2 to 4 grammes ($\frac{1}{2}$ to 1 drachm) is dissolved in half a pint of warm water.

PULVIS CATECHU COMPOSITUS
(Pulv. Catech. Co.)

Compound Powder of Catechu

	Metric	*Imperial*
Catechu, finely powdered ..	400 g.	6 oz. 175 gr.
Kino, finely powdered	200 g.	3 oz. 87½ gr.
Krameria, finely powdered ..	200 g.	3 oz. 87½ gr.
Cinnamon, finely powdered ..	100 g.	1 oz. 262½ gr.
Nutmeg, finely powdered ..	100 g.	1 oz. 262½ gr.

Mix.

Dose.– 0·6 to 4 grammes (10 to 60 grains).

PULVIS CINNAMOMI COMPOSITUS
(Pulv. Cinnam. Co.)

Compound Cinnamon Powder

Synonym—Pulvis Aromaticus.

	Metric	*Imperial*
Cinnamon, finely powdered ..	250 g.	4 oz.
Cardamom, finely powdered ..	250 g.	4 oz.
Ginger, finely powdered ..	250 g.	4 oz.

Mix.

Dose.– 0·6 to 4 grammes (10 to 60 grains).

PULVIS EFFERVESCENS COMPOSITUS DUPLEX
(Pulv. Efferv. Co. Dup.)

Double Compound Effervescent Powder

Synonym—Double-strength Seidlitz Powder.

No. 1.	*Metric*	*Imperial*
Sodium Potassium Tartrate, in dry powder	15·0 g.	231½ gr.
Sodium Bicarbonate, in dry powder	2·5 g.	38½ gr.

Mix, and wrap in blue paper.

No. 2.	*Metric*	*Imperial*
Tartaric Acid, in dry powder ..	2·5 g.	38½ gr.

Wrap in white paper.

Dose.– Dissolve No. 1 powder in a tumbler of cold or warm water; then add No. 2 powder. The liquid should be taken while effervescing.

PULVIS EFFERVESCENS COMPOSITUS FORTIS
(Pulv. Efferv. Co. Fort.)

Strong Compound Effervescent Powder

Synonym—Extra-strong Seidlitz Powder.

No. 1.	*Metric*	*Imperial*
Sodium Potassium Tartrate, in dry powder	11·25 g.	173½ gr.
Sodium Bicarbonate, in dry powder	2·5 g.	38½ gr.

Mix and wrap in blue paper.

No. 2.	*Metric*	*Imperial*
Tartaric Acid, in dry powder ..	2·5 g.	38½ gr.

Wrap in white paper.

Dose.– Dissolve No. 1 powder in a tumbler of cold or warm water; then add No. 2 powder. The liquid should be taken while effervescing.

PULVIS IODOFORMI ET ACIDI BORICI
(Pulv. Iodof. et Acid. Boric.)

Iodoform and Boric Acid Powder

	Metric	*Imperial*
Iodoform, in powder	250 g.	4 oz.
Boric Acid, in powder	750 g.	12 oz.

Mix.

PULVIS KINO COMPOSITUS
(Pulv. Kino Co.)

Compound Powder of Kino

	Metric	*Imperial*
Kino, finely powdered	750 g.	12 oz.
Powdered Opium, in fine powder	50 g.	350 gr.
Cinnamon, finely powdered ..	200 g.	3 oz. 87½ gr.

Mix.

Dose.– 0·3 to 1·2 grammes (5 to 20 grains).

PULVIS LOBELIÆ COMPOSITUS
(Pulv. Lobel. Co.)

Compound Lobelia Powder

	Metric	*Imperial*
Lobelia, in moderately coarse powder	250 g.	4 oz.
Stramonium, in moderately coarse powder	250 g.	4 oz.
Tea, in moderately coarse powder	250 g.	4 oz.
Potassium Nitrate	250 g.	4 oz.
Oil of Anise	1 ml.	8 m.
Distilled Water, boiling	250 ml.	4 fl. oz.

Dissolve the potassium nitrate in the water, add the solution to the mixed powders, mix thoroughly, dry, and add the oil of anise.

PULVIS MAGNESII BOROCITRATIS COMPOSITUS
(Pulv. Mag. Borocit. Co.)

Compound Magnesium Borocitrate Powder

	Metric	*Imperial*
Magnesium Borocitrate	300 g.	5 oz.
Sucrose, in powder	600 g.	10 oz.

Mix.

Dose.– 2 to 4 grammes (½ to 1 drachm).

PULVIS OPII COMPOSITUS
(Pulv. Opii Co.)
Compound Powder of Opium

	Metric	*Imperial*
Powdered Opium, in fine powder	100 g.	1 oz. 262½ gr.
Black Pepper, finely powdered ..	150 g.	2 oz. 175 gr.
Ginger, finely powdered ..	300 g.	4 oz. 350 gr.
Caraway, finely powdered ..	420 g.	6 oz. 315 gr.
Tragacanth, in powder	30 g.	210 gr.

Mix.

Dose.– 0·3 to 1 gramme (5 to 15 grains).

PULVIS PANCREATINI COMPOSITUS
(Pulv. Pancreatin. Co.)
Compound Pancreatin Powder

Synonyms—Peptonising Powder; Pulvis Pancreaticus Compositus.

	Metric	*Imperial*
Pancreatin	200 g.	3 oz. 87½ gr.
Sodium Bicarbonate	800 g.	12 oz. 350 gr.

Mix.

PULVIS PEPSINI COMPOSITUS
(Pulv. Pepsin. Co.)
Compound Pepsin Powder

	Metric	*Imperial*
Pepsin, finely powdered.. ..	150·0 g.	2 oz. 175 gr.
Pancreatin, finely powdered ..	100·0 g.	1 oz. 262½ gr.
Diastase, finely powdered ..	10·0 g.	70 gr.
Lactic Acid	12·5 ml.	96 m.
Hydrochloric Acid	12·5 ml.	96 m.
Lactose, finely powdered	to 1000·0 g.	to 16 oz.

Add the lactic acid and hydrochloric acid gradually to 625 grammes (10 ounces) of the lactose, and triturate until thoroughly mixed; add the pepsin, pancreatin and diastase, previously mixed, and sufficient lactose to produce the required weight; pass the mixture through a fine sieve.

It should be **stored** in well-closed bottles.

Dose.– 0·6 to 2 grammes (10 to 30 grains).

PULVIS SCAMMONIÆ COMPOSITUS
(Pulv. Scammon. Co.)

Compound Powder of Scammony

	Metric	*Imperial*
Scammony Resin, finely powdered	500 g.	8 oz.
Jalap, finely powdered	350 g.	5 oz. 262½ gr.
Ginger, finely powdered ..	150 g.	2 oz. 175 gr.

Mix.

Dose.– 0·6 to 1·2 grammes (10 to 20 grains).

PULVIS SODII CHLORIDI COMPOSITUS
(Pulv. Sod. Chlorid. Co.)

Compound Powder of Sodium Chloride

	Metric	*Imperial*
Sodium Chloride, in powder ..	250 g.	4 oz.
Sodium Bicarbonate	250 g.	4 oz.
Borax, in powder	250 g.	4 oz.
Sucrose, in powder	250 g.	4 oz.

Mix.

PULVIS STRAMONII COMPOSITUS
(Pulv. Stramon. Co.)

Compound Stramonium Powder

	Metric	*Imperial*
Stramonium, in moderately coarse powder	500 g.	8 oz.
Lobelia, in moderately coarse powder	60 g.	420 gr.
Anise, in moderately coarse powder	120 g.	1 oz. 402½ gr.
Tea, in moderately coarse powder	60 g.	420 gr.
Potassium Nitrate	250 g.	4 oz.
Oil of Eucalyptus	10 ml.	75 m.
Distilled Water, boiling	250 ml.	4 fl. oz.

Dissolve the potassium nitrate in the water, add the solution to the mixed powders, mix thoroughly, dry, and add the oil of eucalyptus.

PULVIS TALCI BORICUS

(Pulv. Talc. Boric.)

Boric Talc Powder

Synonym—Talcum Boratum.

	Metric	*Imperial*
Boric Acid, in powder	100 g.	1 oz. 262½ gr.
Starch, in powder	100 g.	1 oz. 262½ gr.
Oil of Geranium	2 ml.	15 m.
Purified Talc	to 1000 g.	to 16 oz.

Incorporate the oil of geranium with the powders, sift and mix

PULVIS ZINCI ET ACIDI BORICI

(Pulv. Zinc. et Acid. Boric.)

Zinc and Boric Acid Powder

	Metric	*Imperial*
Zinc Oxide	500 g.	8 oz.
Boric Acid, in powder	500 g.	8 oz.

Sift and mix.

PULVIS ZINCI ET ACIDI SALICYLICI

(Pulv. Zinc. et Acid. Salicyl.)

Zinc and Salicylic Acid Powder

	Metric	*Imperial*
Zinc Oxide	200 g.	3 oz. 87½ gr.
Salicylic Acid, in powder ..	50 g.	350 gr.
Starch, in powder	750 g.	12 oz.

Sift and mix.

PULVIS ZINCI ET AMYLI

(Pulv. Zinc. et Amyli)

Zinc and Starch Powder

	Metric	*Imperial*
Zinc Oxide	500 g.	8 oz.
Starch, in powder	500 g.	8 oz.

Sift and mix.

PULVIS ZINCI ET AMYLI COMPOSITUS

(Pulv. Zinc. et Amyli Co.)

Compound Zinc and Starch Powder

	Metric	*Imperial*
Zinc Oxide	250 g.	4 oz.
Starch, in powder	250 g.	4 oz.
Boric Acid, in powder	250 g.	4 oz.
Oil of Geranium	2 ml.	15 m.
Purified Talc	to 1000 g.	to 16 oz.

Incorporate the oil of geranium with the powders, sift and mix.

PULVIS ZINCI OLEOSTEARATIS COMPOSITUS

(Pulv. Zinc. Oleostear. Co.)

Compound Zinc Oleostearate Powder

	Metric	*Imperial*
Zinc Oleostearate, in powder	250 g.	4 oz.
Boric Acid, in powder	250 g.	4 oz.
Oil of Geranium	2 ml.	15 m.
Starch, in powder	to 1000 g.	to 16 oz.

Incorporate the oil of geranium with the powders, sift and mix.

PULVIS ZINCI SULPHATIS COMPOSITUS

(Pulv. Zinc. Sulph. Co.)

Compound Zinc Sulphate Powder

Synonyms—Pulvis Acidi Borici Compositus; Compound Boric Acid Powder; Pulvis Antisepticus Solubilis; Soluble Antiseptic Powder.

	Metric	*Imperial*
Zinc Sulphate	125 g.	2 oz.
Eucalyptol	1 g.	7 gr.
Menthol	1 g.	7 gr.
Phenol	1 g.	7 gr.
Salicylic Acid	5 g.	35 gr.
Thymol	1 g.	7 gr.
Boric Acid, in powder	866 g.	13 oz. 374½ gr.

Triturate together the menthol, phenol and thymol, add the eucalyptol, and then the salicylic acid and zinc sulphate, previously finely powdered; then gradually add the boric acid in small portions, mixing thoroughly.

RESINA CARBOLISATA
(Res. Carbol.)
Carbolised Resin

	Metric	*Imperial*
Phenol	20 g.	1 oz.
Mastic, in powder	20 g.	1 oz.
Colophony, in powder	40 g.	2 oz.
Chloroform	20 ml.	1 fl. oz.

Shake together in a stoppered bottle until dissolved.

SAL APERIENS SULPHURATUM
(Sal Aper. Sulphurat.)
Sulphurated Aperient Salt

Synonym—Harrogate Salts.

	Metric	*Imperial*
Potassium Acid Tartrate ..	150 g.	2 oz. 175 gr.
Sulphurated Potash	30 g.	210 gr.
Exsiccated Magnesium Sulphate	820 g.	13 oz. 52½ gr.

Reduce to fine powder and mix.

Dose.– 4 to 8 grammes (1 to 2 drachms).

SAL CAROLINUM FACTITIUM
(Sal Carol. Fact.)
Artificial Carlsbad Salt

	Metric	*Imperial*
Sodium Sulphate	550 g.	8 oz. 350 gr.
Potassium Sulphate	10 g.	70 gr.
Sodium Chloride	100 g.	1 oz. 262½ gr.
Sodium Carbonate	350 g.	5 oz. 262½ gr.
Distilled Water	550 ml.	8 fl.oz. 384 m.

Dissolve the potassium sulphate and sodium chloride in the water, and add the solution to the sodium carbonate and sodium sulphate, previously melted in a tared dish; evaporate until the weight of the product is 1000 grammes (16 ounces) and set aside to cool, stirring frequently so as to avoid the formation of large crystals. Distribute any remaining mother liquor uniformly over the crystals, and dry by exposure to the air.

Dose.– 2 to 6 grammes (½ to 1½ drachms).

SAL CAROLINUM FACTITIUM EFFERVESCENS

(Sal Carol. Fact. Efferv.)

Effervescent Artificial Carlsbad Salt

Synonym—Effervescent Carlsbad Powder.

	Metric	*Imperial*
Exsiccated Sodium Sulphate ..	90·0 g.	1 oz. 192½ gr.
Sodium Potassium Tartrate ..	380·0 g.	6 oz. 35 gr.
Sodium Chloride..	30·0 g.	210 gr.
Sodium Bicarbonate	330·0 g.	5 oz. 122½ gr.
Saccharin	0·5 g.	3½ gr.
Tartaric Acid	169·5 g.	2 oz. 311½ gr.

Dry the ingredients separately, powder and mix.

Dose.– 4 to 8 grammes (1 to 2 drachms).

SEVUM BENZOINATUM

(Sev. Benz.)

Benzoinated Suet

	Metric	*Imperial*
Suet	1000 g.	16 oz.
Benzoin, coarsely powdered ..	30 g.	210 gr.

Melt the suet, add the benzoin, and maintain at a temperature of 60° for one hour, stirring frequently; strain, and stir constantly until cold.

SEVUM PHOSPHORATUM

(Sev. Phosphor.)

Phosphorated Suet

	Metric	*Imperial*
Phosphorus	100 g.	1 oz. 262½ gr.
Suet	900 g.	14 oz. 175 gr.

Dissolve the phosphorus in 500 millilitres (8 fluid ounces) of carbon disulphide, add a little of the suet and mix quickly, then add the remainder of the suet, mix thoroughly, and allow the carbon disulphide to evaporate.

Dose.– 0·006 to 0·03 gramme ($\frac{1}{10}$ to $\frac{1}{2}$ grain).

SOLVELLÆ

Solution-Tablets

Solution-tablets are compressed tablets intended to be dissolved in water for external or local use. In the preparation of these tablets it is necessary that all the ingredients, including the lubricant and any diluent, should be readily soluble in water. The lubricant generally used is boric acid, and sodium chloride is often employed as a diluent.

Solution-tablets may be prepared in the manner described for ordinary tablets, but when they contain poisonous ingredients, a suitable dye is often added to distinguish them. When the proportion of medicament to be contained in each solution-tablet is not stated by the prescriber, the following quantity should be dispensed:—

Solvellæ Acidi Borici.—Boric acid, 1 gramme (15 grains).

Solvellæ Aluminis.—Alum, 0·6 gramme (10 grains).

Solvellæ Potassii Permanganatis.—Potassium permanganate, 0·3 gramme (5 grains).

Solvellæ Sodii Chloridi.—Sodium chloride, 1·3 gramme (20 grains).

SOLVELLÆ ACIDI TANNICI COMPOSITÆ

(Solv. Acid. Tann. Co.)

Compound Tannic Acid Solution-Tablets

	Metric	*Imperial*
Tannic Acid, in powder ..	56·70 g.	2 oz.
Mercuric Chloride, in powder ..	1·62 g.	25 gr.
Boric Acid, in powder	19·44 g.	300 gr.
Lactose, in powder	12·96 g.	200 gr.

Carefully mix the mercuric chloride with the tannic acid, and granulate with the aid of a sufficient quantity [about 10·6 millilitres (180 minims)] of syrup or of mucilage of acacia, add the boric acid and lactose, mix and compress lightly into 100 tablets.

SOLVELLÆ ANTISEPTICÆ

(Solv. Antisep.)

Antiseptic Solution-Tablets

Synonym—Effervescing Mouth-Wash Tablets.

	Metric	*Imperial*
Sodium Bicarbonate	32·40 g.	1 oz. 62½ gr.
Borax, in powder	19·44 g.	300 gr.
Sodium Benzoate, in powder ..	3·24 g.	50 gr.
Boric Acid, in powder	3·24 g.	50 gr.
Menthol, in powder	0·08 g.	1¼ gr.
Thymol, in powder	0·08 g.	1¼ gr.
Oil of Eucalyptus	0·30 ml.	5 m.
Oil of Lemon	0·30 ml.	5 m.
Tartaric Acid, in powder ..	25·92 g.	400 gr.
Saccharin	0·06 g.	1 gr.
Lactose, in powder	19·44 g.	300 gr.
Eosin	0·10 g.	1½ gr.
Solution of Carmine	7·10 ml.	2 fl. dr.
Distilled Water	7·10 ml.	2 fl. dr.

Dissolve the eosin in the distilled water and mix with the solution of carmine. Dry the tartaric acid and the lactose separately, by the application of heat; mix the dried powders, granulate with a sufficient quantity of the solution of eosin and carmine, and dry the granules. Mix the saccharin, sodium bicarbonate, borax and sodium benzoate with the remainder of the solution of eosin and carmine; granulate, dry the granules and mix them with the previously granulated tartaric acid and lactose. Mix the menthol, thymol, oil of eucalyptus and oil of lemon with the boric acid, mix with the granules and compress into 100 tablets.

They should be **stored** in dry, well-closed containers.

SOLVELLÆ BORACIS COMPOSITÆ

(Solv. Borac. Co.)

Compound Solution-Tablets of Borax

	Metric	*Imperial*
Borax	32·40 g.	1 oz. 62½ gr.
Sodium Chloride	16·20 g.	250 gr.
Thymol	0·32 g.	5 gr.
Sodium Bicarbonate	16·20 g.	250 gr.

Mix, and make into 100 tablets.

SOLVELLÆ BORACIS ET BENZAMINÆ COMPOSITÆ

(Solv. Borac. et Benzamin. Co.)

Compound Solution-Tablets of Borax and Benzamine

Synonym—Naso-Pharyngeal Solution-Tablets.

	Metric	*Imperial*
Sodium Chloride	32·40 g.	1 oz. 62½ gr.
Borax	19·44 g.	300 gr.
Boric Acid	6·48 g.	100 gr.
Sodium Benzoate	3·24 g.	50 gr.
Menthol	0·06 g.	1 gr.
Thymol	0 06 g.	1 gr.
Benzamine Hydrochloride	1·62 g.	25 gr.
Oil of Sweet Birch	0 30 ml.	5 m.

Mix, and make into 100 tablets.

One solution-tablet should be dissolved in 60 to 90 millilitres (2 to 3 fluid ounces) of warm water.

SOLVELLÆ BORACIS ET COCAINÆ COMPOSITÆ

(Solv. Borac. et Cocain. Co.)

Compound Solution-Tablets of Borax and Cocaine

	Metric	*Imperial*
Sodium Chloride	32·40 g.	1 oz. 62½ gr.
Borax	19·44 g.	300 gr.
Boric Acid	6·48 g.	100 gr.
Sodium Benzoate	3·24 g.	50 gr.
Menthol	0 06 g.	1 gr.
Thymol	0·06 g.	1 gr.
Cocaine Hydrochloride	0·54 g.	8⅓ gr.
Oil of Sweet Birch	0·30 ml.	5 m.

Mix, and make into 100 tablets.

One solution-tablet should be dissolved in 60 to 90 millilitres (2 to 3 fluid ounces) of warm water.

SOLVELLÆ HYDRARGYRI IODIDI

(Solv. Hydrarg. Iod.)

Mercuric Iodide Solution-Tablets

Synonym—Soluble Biniodide Tablets.

	Metric	*Imperial*
Mercuric Iodide	56 76 g.	2 oz.
Potassium Iodide	45·36 g.	1 oz. 262½ gr.
Eosin	0·13 g.	2 gr.

Mix, and make into 100 tablets.

One solution-tablet dissolved in 20 fluid ounces of water forms a solution containing 1 in 1000 of mercuric iodide.

SOLVELLÆ HYDRARGYRI OXYCYANIDI

(Solv. Hydrarg. Oxycyanid.)

Mercuric Oxycyanide Solution-Tablets

	Metric	*Imperial*
Mercuric Oxycyanide	28·35 g.	1 oz.
Eosin	0·03 g.	½ gr.

Mix, and make into 100 tablets.

One solution-tablet dissolved in 20 fluid ounces of water forms a solution containing 1 in 2000 of mercuric oxycyanide.

SOLVELLÆ HYDRARGYRI PERCHLORIDI

(Solv. Hydrarg. Perchlor.)

Mercuric Chloride Solution-Tablets

Synonyms—Antiseptic Perchloride Tablets; Antiseptic Corrosive Sublimate Tablets.

	Metric	*Imperial*
Mercuric Chloride	56·70 g.	2 oz.
Sodium Chloride..	56·70 g.	2 oz.
Methylene Blue	0·39 g.	6 gr.

Mix, and make into 100 tablets.

One solution-tablet dissolved in 20 fluid ounces of water forms a solution containing 1 in 1000 of mercuric chloride.

SPIRITUS ÆTHERIS COMPOSITUS

(Sp. Æther. Co.)

Compound Spirit of Ether

Synonym—Hoffmann's Anodyne.

	Metric	*Imperial*
Ether	137·5 ml.	2¾ fl. oz.
Alcohol (90 per cent.)	1950·0 ml.	39 fl. oz.
Sulphuric Acid	900·0 ml.	18 fl. oz.
Distilled Water	37·5 ml.	¾ fl. oz.
Sodium Bicarbonate	a sufficient quantity	

Gradually mix the sulphuric acid with 1000 millilitres (20 fluid ounces) of the alcohol, allow the mixture to stand for twenty-four hours, and then distil slowly until the temperature of the liquid rises to 171·6°. Pour the distillate into a separator and reject the lower layer. Add the distilled water to the upper layer and gradually add sodium bicarbonate until, after thorough agitation, the mixture is nearly neutral to litmus. Separate the ethereal liquid, add the ether and 950 millilitres (19 fluid ounces) of the alcohol, and filter.

Standard.—Compound spirit of ether has a specific gravity of 0·808 to 0·812. It gives an opalescent solution when mixed with twice its volume of water. The residue obtained on evaporating spontaneously 2 or 3 millilitres on a watch-glass has no unpleasant odour (absence of empyreumatic impurities).

Dose.– For a single administration, 4 to 6 millilitres (1 to 1½ fluid drachms); for repeated administration, 1·3 to 2·6 millilitres (20 to 40 minims).

Alcohol content, 63 to 68 per cent. v/v of ethyl alcohol.

SPIRITUS AMMONIÆ FETIDUS
(Sp. Ammon. Fetid.)
Fetid Spirit of Ammonia

	Metric	*Imperial*
Asafetida	75 g.	1½ oz.
Strong Solution of Ammonia ..	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Break the asafetida into small pieces and macerate it in 750 millilitres (15 fluid ounces) of the alcohol in a closed vessel for twenty-four hours; then distil until alcoholic vapours cease to be condensed, add to the distillate the strong solution of ammonia and sufficient of the alcohol to produce the required volume.

Standard.—Fetid spirit of ammonia contains not less than 2·72 per cent. w/v of NH_3. Specific gravity, 0·842 to 0·850.

Assay.—Add 20 millilitres to 50 millilitres of N/1 sulphuric acid and titrate with N/1 sodium hydroxide, using methyl red as indicator; each millilitre of N/1 sulphuric acid is equivalent to 0·01703 gramme of NH_3.

Dose.– For a single administration, 4 to 6 millilitres (1 to 1½ fluid drachms); for repeated administration, 1·3 to 2·6 millilitres (20 to 40 minims).

Alcohol content, 78 to 82 per cent. v/v of ethyl alcohol.

SPIRITUS AMYGDALÆ AMARÆ
(Sp. Amygdal. Amar.)
Spirit of Bitter Almond

Synonym—Essence of Bitter Almonds.

	Metric	*Imperial*
Oil of Bitter Almond without Hydrocyanic Acid	62·5 ml.	1¼ fl. oz.
Alcohol (90 per cent.)	to 1000·0 ml.	to 20 fl. oz.

Dissolve.

Alcohol content, 82 to 85 per cent. v/v of ethyl alcohol.

SPIRITUS ANISI
(Sp. Anis.)
Spirit of Anise

	Metric	*Imperial*
Oil of Anise	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Dissolve. When not clear, shake with a little purified talc or kaolin, and filter.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

Alcohol content, 79 to 82 per cent. v/v of ethyl alcohol.

SPIRITUS ARMORACIÆ COMPOSITUS
(Sp. Armor. Co.)
Compound Spirit of Horseradish

	Metric	*Imperial*
Horseradish, scraped	125 g.	2½ oz.
Dried Bitter-Orange Peel, bruised	125 g.	2½ oz.
Nutmeg, bruised	3 g.	26¼ gr.
Alcohol (90 per cent.)	625 ml.	12½ fl. oz.
Distilled Water	750 ml.	15 fl. oz.

Macerate the horseradish in the distilled water for one hour, add the other ingredients, and distil 1000 millilitres (20 fluid ounces).

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Alcohol content, 53 to 59 per cent. v/v of ethyl alcohol.

SPIRITUS CHIRURGICALIS
(Sp. Chir.)
Surgical Spirit

The use of industrial methylated spirit in preparing surgical spirit from the two following formulæ is approved by the Board of Customs and Excise:—

No. 1	*Metric*	*Imperial*
Castor Oil	25 ml.	½ fl. oz.
Methyl Salicylate	5 ml.	48 m.
Ethyl Phthalate	20 ml.	192 m.
Industrial Methylated Spirit ..	to 1000 ml.	to 20 fl. oz.

Dissolve.

No. 2	*Metric*	*Imperial*
Castor Oil	27·5 ml.	264 m.
Mineral Naphtha	2·5 ml.	24 m.
Ethyl Phthalate	20·0 ml.	192 m.
Industrial Methylated Spirit ..	to 1000·0 ml.	to 20 fl. oz.

Dissolve.

SPIRITUS CINNAMOMI
(Sp. Cinnam.)
Spirit of Cinnamon

	Metric	*Imperial*
Oil of Cinnamon	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Dissolve. When not clear, shake with a little purified talc or kaolin, and filter.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

Alcohol content, 79 to 82 per cent. v/v of ethyl alcohol.

SPIRITUS COLONIENSIS
(Sp. Colon.)
Cologne Spirit

Synonym—Aqua Coloniensis.

	Metric	*Imperial*
Oil of Bergamot	12·5 ml.	120 m.
Oil of Lemon	5·0 ml.	48 m.
Oil of Neroli	2·1 ml.	20 m.
Oil of Rosemary	1·6 ml.	15 m.
Oil of Thyme	0·5 ml.	5 m.
Triple Orange-flower Water ..	45·0 ml.	432 m.
Alcohol (90 per cent.) ..	..to 1000·0 ml.	to 20 fl. oz.

Dissolve the oils in about 900 millilitres (18 fluid ounces) of the alcohol, add the orange-flower water gradually, and then add sufficient alcohol to produce the required volume.

Alcohol content, 80 to 83 per cent. v/v of ethyl alcohol.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the final product contains 1 per cent. v/v of ethyl phthalate and that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

SPIRITUS JUNIPERI
(Sp. Junip.)
Spirit of Juniper

	Metric	*Imperial*
Oil of Juniper	100 ml.	2 fl. oz
Alcohol (90 per cent.) ..	.. to 1000 ml.	to 20 fl. oz

Dissolve. When not clear, shake with a little purified talc or kaolin, and filter.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

Alcohol content, 79 to 82 per cent. v/v of ethyl alcohol.

SPIRITUS LAVANDULÆ
(Sp. Lavand.)
Spirit of Lavender

	Metric	*Imperial*
Oil of Lavender	100 ml.	2 fl. oz
Alcohol (90 per cent.) ..	.. to 1000 ml.	to 20 fl. oz

Dissolve. When not clear, shake with a little purified talc or kaolin, and filter.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

Alcohol content, 79 to 82 per cent. v/v of ethyl alcohol.

SPIRITUS LAVANDULÆ COMPOSITUS

(Sp. Lavand. Co.)

Compound Spirit of Lavender

Synonym—Aqua Lavandulæ.

	Metric	*Imperial*
Oil of Lavender	31·2 ml.	300 m.
Oil of Bergamot	13·0 ml.	125 m.
Oil of Peppermint	0·5 ml.	5 m.
Oil of Clove	0·8 ml.	7½ m.
Oil of Rose	1·0 ml.	10 m.
Spirit of Nitrous Ether	13·0 ml.	125 m.
Alcohol (90 per cent.)	875·0 ml.	17½ fl. oz.
Distilled Water	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the oils in the alcohol, add the spirit of nitrous ether and sufficient distilled water to produce the required volume.

Alcohol content, 76 to 80 per cent. v/v of ethyl alcohol.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the final product contains 1 per cent. v/v of ethyl phthalate and that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

SPIRITUS MENTHOLIS

(Sp. Menthol.)

Spirit of Menthol

	Metric	*Imperial*
Menthol	50 g.	1 oz.
Alcohol (90 per cent.) ..	.. to 1000 ml.	to 20 fl. oz.

Dissolve.

Alcohol content, 84 to 87 per cent. v/v of ethyl alcohol.

SPIRITUS MENTHOLIS COMPOSITUS

(Sp. Menthol. Co.)

Compound Spirit of Menthol

	Metric	*Imperial*
Camphor	100 g.	2 oz.
Menthol	100 g.	2 oz.
Terebene	100 ml.	2 fl. oz.
Eucalyptol	100 ml.	2 fl. oz.
Alcohol (90 per cent.) ..	.. to 1000 ml.	to 20 fl. oz.

Dissolve.

Dose.– 10 drops, by inhalation.

Alcohol content, 48 to 52 per cent. v/v of ethyl alcohol.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

SPIRITUS MYRCIÆ COMPOSITUS

(Sp. Myrc. Co.)

Compound Spirit of Bay

Synonyms—Spiritus Pimentæ Compositus; Compound Spirit of Pimento.

	Metric	*Imperial*
Oil of Bay	7·5 ml.	72 m.
Oil of Orange	0·5 ml.	5 m.
Oil of Pimento	0·5 ml.	5 m.
Dry Extract of Quassia	0·9 g.	7½ gr.
Alcohol (90 per cent.)	640·0 ml.	12 fl. oz. 384 m.
Distilled Water	.. to 1000·0 ml.	to 20 fl. oz.

Dissolve the oils and the dry extract of quassia in the alcohol and gradually add sufficient distilled water to produce the required volume; set aside for eight days, add a little purified talc or kaolin, and filter.

Alcohol content, 55 to 58 per cent. v/v of ethyl alcohol.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

SPIRITUS MYRISTICÆ

(Sp. Myrist.)

Spirit of Nutmeg

	Metric	*Imperial*
Oil of Nutmeg	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Dissolve.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

Alcohol content, 79 to 82 per cent. v/v of ethyl alcohol.

SPIRITUS PULEGII

(Sp. Puleg.)

Spirit of Pulegium

Synonyms—Essence of Pennyroyal; Essentia Pulegii; Essence of Pulegium.

	Metric	*Imperial*
Oil of Pulegium	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Dissolve.

Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

Alcohol content, 79 to 82 per cent. v/v of ethyl alcohol.

SPIRITUS RESORCINOLIS

(Sp. Resorcin.)

Spirit of Resorcinol

Synonyms—Spiritus Capillaris; Lotio Resorcinolis Composita; Spiritus Resorcini; Spirit of Resorcin.

	Metric	*Imperial*
Resorcinol	25 g.	½ oz.
Castor Oil	25 ml.	½ fl. oz.
Cologne Spirit	200 ml.	4 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Dissolve the resorcinol and castor oil in the Cologne spirit and a portion of the alcohol, and add sufficient of the alcohol to produce the required volume.

Alcohol content, 84 to 87 per cent. v/v of ethyl alcohol.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

SPIRITUS ROSMARINI

(Sp. Rosmarin.)

Spirit of Rosemary

	Metric	*Imperial*
Oil of Rosemary	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Dissolve.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

Alcohol content, 79 to 82 per cent. v/v of ethyl alcohol.

SPIRITUS SAPONATUS
(Sp. Sap.)
Soap Spirit

	Metric	*Imperial*
Soft Soap	650 g.	13 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Dissolve.

Alcohol content, 28 to 31 per cent. v/v of ethyl alcohol.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

SPIRITUS SAPONIS KALINI
(Sp. Sap. Kalin.)
Spirit of Potash Soap

Synonym—Spiritus Saponis Kalini (Hebra).

	Metric	*Imperial*
Potash Soap	650 g.	13 oz.
Oil of Lavender	3 ml.	29 m.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Dissolve.

Alcohol content, 28 to 31 per cent. v/v of ethyl alcohol.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

SUCCUS ALLII
(Succ. Allii)
Juice of Garlic

	Metric	*Imperial*
Garlic, fresh	800 g.	16 oz.
Alcohol (90 per cent.)	200 ml.	4 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Bruise the garlic and express the juice; mix the pressed marc with 200 millilitres (4 fluid ounces) of distilled water and again express the liquid, repeating the operation until the volume of the mixed juice and washings amounts to 800 millilitres (16 fluid ounces); add the alcohol and sufficient distilled water to produce the required volume. Allow to stand for not less than fourteen days, and decant or filter.

Dose.– 2 to 4 millilitres ($\frac{1}{2}$ to 1 fluid drachm).

SUCCUS CONII

(Succ. Conii)

Juice of Conium

Synonym—Juice of Hemlock.

Bruise fresh conium leaf and press out the juice; to every three volumes of juice add one volume of alcohol (90 per cent.); set aside for seven days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SUCCUS HYOSCYAMI

(Succ. Hyoscy.)

Juice of Hyoscyamus

Bruise the fresh leaves and flowering tops of *Hyoscyamus niger* Linn., and press out the juice; to every three volumes of juice add one volume of alcohol (90 per cent.), set aside for seven days, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SUCCUS SCOPARII

(Succ. Scopar.)

Juice of Scoparium

Synonym—Juice of Broom.

Bruise fresh scoparium and press out the juice; to every three volumes of juice add one volume of alcohol (90 per cent.), set aside for seven days, and filter.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SUCCUS TARAXACI

(Succ. Tarax.)

Juice of Taraxacum

Bruise fresh taraxacum root and press out the juice; to every three volumes of juice add one volume of alcohol (90 per cent.), set aside for seven days, and filter.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SUPPOSITORIA

Suppositories

Suppositories are solid bodies, suitably shaped for anal administration, and uniformly medicated with substances which are usually intended to act locally. They are usually conical, or occasionally torpedo-shaped. The basis employed in making suppositories should be non-irritating, hard enough to be handled, and yet melt readily at body temperature (37°). Unless otherwise specified, suppositories are prepared with oil of theobroma, which melts between 30° and 35°.

When melting oil of theobroma, it is important to remember that overheating will cause a lowering of the solidifying-point, and subsequently the suppositories may set only with difficulty; it is advisable, therefore, to use powdered or shredded oil of theobroma, which melts readily. An alternative basis is the glycerin suppository mass of the British Pharmacopœia. It should only be employed when specified, since the gelatin is incompatible with several substances, including tannins. A small quantity of white beeswax in conjunction with oil of theobroma, sufficient to raise the melting-point to not more than 37°, is sometimes used in the preparation of suppositories containing substances such as phenol or chloral hydrate. This addition may be obviated, except in the case of suppositories containing volatile oil, by using the minimum amount of heat. In tropical and sub-tropical climates, sufficient white beeswax to suit conditions of temperature may be added, in place of an equivalent amount of oil of theobroma, when the suppositories would otherwise be too soft for use.

Suppositories are generally moulded, the moulds holding 1 gramme (15 grains) or 2 grammes (30 grains) of oil of theobroma. Unless otherwise specified, a 1 gramme mould should be employed. A 1 gramme mould will hold about 1·2 grammes (18 grains) of glycerin suppository mass. Dry solid medicaments are first very finely powdered; soft extracts are rubbed smooth with a minimum quantity of water or other suitable liquid. They are then triturated with a small portion of the melted basis, and the resulting mixture is added to the bulk of the basis, the whole being stirred until uniform. The medicated basis, allowed to cool until about to solidify, is poured into a cold and lubricated mould. Almond oil, and a solution of soft soap in alcohol (90 per cent.) (1 in 2) containing about 5 per cent. of glycerin, are frequently employed as mould lubricants. In cases where the use of heat is undesirable, the medicament can be worked into a uniform mass with shredded oil of theobroma and shaped by cold compression in the mould or by means of a suitable machine.

Suppositories should be sent out in partitioned boxes or in shallow boxes lined with waxed paper, and when made with glycerin suppository mass, they should be very slightly greased with oil or liquid paraffin. When made for tropical climates, or when containing volatile ingredients, suppositories should be wrapped separately in tin-foil.

SUPPOSITORIUM ADRENALINÆ
(Supp. Adrenal.)

Adrenaline Suppository

	Metric	*Imperial*
Adrenaline	0·001 g.	$\frac{1}{60}$ gr.
Boric Acid	0·002 g.	$\frac{1}{30}$ gr.
Distilled Water	0·059 ml.	1 m.
Wool Fat	0·097 g.	$1\frac{1}{2}$ gr.

Oil of Theobroma, sufficient to fill a 1 gramme (15 grain) mould.

Dissolve the boric acid in the distilled water, add the adrenaline, dissolve, mix thoroughly with the wool fat, add the melted oil of theobroma, stir well together, and pour into a mould.

SUPPOSITORIUM ADRENALINÆ ET COCAINÆ
(Supp. Adrenal. et Cocain.)

Adrenaline and Cocaine Suppository

	Metric	*Imperial*
Adrenaline	0·001 g.	$\frac{1}{60}$ gr.
Cocaine Hydrochloride	0·016 g.	$\frac{1}{4}$ gr.
Boric Acid	0·002 g.	$\frac{1}{30}$ gr.
Distilled Water	0·059 ml.	1 m.
Wool Fat	0·130 g.	2 gr.

Oil of Theobroma, sufficient to fill a 1 gramme (15 grain) mould.

Dissolve the boric acid in the distilled water, add the adrenaline and cocaine hydrochloride, dissolve, mix thoroughly with the wool fat, add the melted oil of theobroma, stir well together, and pour into a mould.

SUPPOSITORIUM BISMUTHI SUBGALLATIS
(Supp. Bism. Subgall.)

Bismuth Subgallate Suppository

	Metric	*Imperial*
Bismuth Subgallate	0·32 g.	5 gr.

Oil of Theobroma, sufficient to fill a 1 gramme (15 grain) mould.

Mix the bismuth subgallate with a portion of the melted oil of theobroma, add the mixture to the remainder of the melted oil of theobroma, mix, and pour into a mould.

SUPPOSITORIUM BISMUTHI SUBGALLATIS COMPOSITUM

(Supp. Bism. Subgall. Co.)

Compound Bismuth Subgallate Suppository

Synonyms—Suppositorium Bismuthi et Resorcini Compositum; Compound Bismuth and Resorcin Suppository.

	Metric	*Imperial*
Bismuth Subgallate	0·194 g.	3 gr.
Resorcinol	0·065 g.	1 gr.
Zinc Oxide	0·130 g.	2 gr.
Balsam of Peru	0·059 ml.	1 m.

Oil of Theobroma, sufficient to fill a 1 gramme (15 grain) mould.

Powder the bismuth subgallate and resorcinol, add the zinc oxide and balsam of Peru, make into a smooth paste with part of the melted oil of theobroma, gradually add the remainder, and pour into a mould.

SUPPOSITORIUM GLYCERINI SAPONATUM

(Supp. Glycer. Sap.)

Glycerin Soap Suppository

	Metric	*Imperial*
Glycerin	90·0 g.	4 oz.
Sodium Carbonate	4·5 g.	87½ gr.
Stearic Acid	7·5 g.	146 gr.

Dissolve the sodium carbonate in the glycerin with the aid of gentle heat, add the stearic acid, and heat carefully until effervescence has ceased and solution is complete; then pour the hot mixture into suitable moulds, each capable of containing from 1 to 4 grammes (15 to 60 grains).

The suppositories should be wrapped separately in tin-foil and **stored** in a stoppered bottle.

SUPPOSITORIUM HAMAMELINI ET ZINCI OXIDI

(Supp. Hamam. et Zinc. Oxid.)

Hamamelin and Zinc Oxide Suppository

	Metric	*Imperial*
Dry Extract of Hamamelis ..	0·19 g.	3 gr.
Zinc Oxide	0·65 g.	10 gr.

Oil of Theobroma, sufficient to fill a 2 gramme (30 grain) mould.

Triturate the extract of hamamelis and the zinc oxide to a smooth paste with part of the melted oil of theobroma, mix with the remainder, and pour into a mould.

SUPPOSITORIUM ICHTHAMMOLIS

(Supp. Ichtham.)

Ichthammol Suppository

Synonym—Ammonium Ichthosulphonate Suppository.

	Metric	*Imperial*
Ichthammol	0·19 g.	3 gr.

Suppository of Glycerin, sufficient to fill a 1 gramme (15 grain) mould.

Mix the ichthammol with the melted suppository of glycerin, and pour into a mould.

SUPPOSITORIUM NUTRIENS

(Supp. Nutr.)

Nutrient Suppository

Synonyms—Suppositorium Peptoni; Peptone Suppository.

	Metric	*Imperial*
Beef Peptone	75·0 g.	7½ oz.
Gelatin	7·5 g.	¾ oz.
Distilled Water	17·5 ml.	1¾ fl. oz.

Soften the gelatin in the water and warm on a water-bath until dissolved; add the beef peptone and pour into moulds of the required size. The quantity of gelatin may be varied if necessary.

SYRUPUS ACACIÆ

(Syr. Acac.)

Syrup of Acacia

	Metric	*Imperial*
Mucilage of Acacia	250 ml.	5 fl. oz.
Syrup	to 1000 ml.	to 20 fl. oz.

Mix.

It should be freshly prepared.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

SYRUPUS ACIDI HYDRIODICI

(Syr. Acid. Hydriod.)

Syrup of Hydriodic Acid

	Metric	*Imperial*
Dilute Hydriodic Acid	100 ml.	2 fl. oz.
Distilled Water	50 ml.	1 fl. oz.
Syrup	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS ACIDI LACTICI
(Syr. Acid. Lact.)
Syrup of Lactic Acid

	Metric	*Imperial*
Lactic Acid	25 ml.	½ fl. oz.
Syrup	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS ALLII
(Syr. Allii)
Syrup of Garlic

	Metric	*Imperial*
Juice of Garlic	200 ml.	4 fl. oz.
Sucrose	800 g.	16 oz.
Dilute Acetic Acid	200 ml.	4 fl. oz.
Distilled Water	200 ml.	4 fl. oz.

Mix the dilute acetic acid and the distilled water, and dissolve the sucrose in the mixture in a tared vessel with the aid of heat; allow to cool, and make up to the original weight, if necessary, by the addition of distilled water; add the juice of garlic.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

SYRUPUS ALTHÆÆ
(Syr. Alth.)
Syrup of Althæa

Synonym—Syrup of Marshmallow.

	Metric	*Imperial*
Althæa	40·0 g.	350 gr.
Sucrose	900·0 g.	18 oz.
Chloroform	2·5 ml.	24 m.
Distilled Water	560·0 ml.	11 fl. oz. 96 m.

Cut the althæa into slices and macerate with the water for twelve hours, then strain, press, and filter into a tared vessel; dissolve the sucrose in the filtrate, heating the syrup to boiling, allow to cool, replace any water lost by evaporation, and strain through flannel; add the chloroform, and shake until dissolved.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms.)

SYRUPUS ANISI
(Syr. Anis.)
Syrup of Anise

	Metric	*Imperial*
Concentrated Anise Water ..	125 ml.	2½ fl. oz.
Syrup	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS APOMORPHINÆ
(Syr. Apomorph.)
Syrup of Apomorphine

	Metric	*Imperial*
Apomorphine Hydrochloride ..	0·5 g.	4½ gr.
Dilute Hydrochloric Acid ..	2·5 ml.	24 m.
Alcohol (90 per cent.)	45·0 ml.	432 m.
Distilled Water	45·0 ml.	432 m.
Syrup	to 1000·0 ml.	to 20 fl. oz.

Dissolve the apomorphine hydrochloride in the alcohol, distilled water and dilute hydrochloric acid, previously mixed; then add sufficient syrup to produce the required volume.

It should be **stored** protected from light.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS AROMATICUS
(Syr. Aromat.)
Aromatic Syrup

	Metric	*Imperial*
Liquid Extract of Orange ..	62·5 ml.	1¼ fl. oz.
Cinnamon Water	250·0 ml.	5 fl. oz.
Syrup	to 1000·0 ml.	to 20 fl. oz.

Mix the liquid extract of orange and cinnamon water, shake the mixture with a little purified talc or kaolin, filter, and add to the filtrate sufficient syrup to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS AURANTII FLORIS

(Syr. Aurant. Flor.)

Syrup of Orange-flower

	Metric	*Imperial*
Triple Orange-flower Water	150 ml.	3 fl. oz.
Sucrose	300 g.	6 oz.
Syrup	to 1000 ml.	to 20 fl. oz.

Mix the triple orange-flower water with the sucrose in a closed vessel and allow to stand in a moderately warm place, shaking occasionally, until dissolved; then add sufficient syrup to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS BROMOFORMI COMPOSITUS

(Syr. Bromof. Co.)

Compound Syrup of Bromoform

	Metric	*Imperial*
Bromoform	1·6 ml.	15 m.
Codeine	0·5 g.	4½ gr.
Tincture of Aconite	2·1 ml.	20 m.
Spirit of Bitter Almond	1·0 ml.	10 m.
Alcohol (90 per cent.)	50·0 ml.	1 fl. oz.
Cherry-laurel Water	50·0 ml.	1 fl. oz.
Glycerin	100·0 ml.	2 fl. oz.
Syrup of Red Poppy	150·0 ml.	3 fl. oz.
Syrup of Tolu	to 1000·0 ml.	to 20 fl. oz.

Dissolve the codeine in the alcohol, dissolve the bromoform in the solution, and add the tincture of aconite, spirit of bitter almond and glycerin; add the solution gradually, with constant agitation, to a mixture of the syrup of red poppy, cherry-laurel water and 500 millilitres (10 fluid ounces) of syrup of tolu, and finally add sufficient syrup of tolu to produce the required volume.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

SYRUPUS CALCII CHLORIDI

(Syr. Calc. Chlorid.)

Syrup of Calcium Chloride

Synonyms—Exilir Calcii Chloridi; Elixir of Calcium Chloride.

	Metric	*Imperial*
Calcium Chloride	125 g.	2½ oz.
Distilled Water	150 ml.	3 fl. oz.
Syrup of Lemon	to 1000 ml.	to 20 fl. oz.

Dissolve the calcium chloride in the distilled water, and add sufficient syrup of lemon to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS CALCII HYPOPHOSPHITIS

(Syr. Calc. Hypophosph.)

Syrup of Calcium Hypophosphite

	Metric	*Imperial*
Calcium Hypophosphite ..	18·3 g.	160 gr.
Hypophosphorous Acid	2·5 ml.	24 m.
Sucrose	800·0 g.	16 oz.
Distilled Water	..to 1000·0 ml.	to 20 fl. oz.

Dissolve the calcium hypophosphite in 450 millilitres (9 fluid ounces) of the distilled water, filter if necessary, add the sucrose and dissolve with the aid of gentle heat; add the hypophosphorous acid and sufficient distilled water to produce the required volume.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

SYRUPUS CALCII LACTOPHOSPHATIS

(Syr. Calc. Lactophosph.)

Syrup of Calcium Lactophosphate

	Metric	*Imperial*
Calcium Lactate	75 g.	1½ oz.
Phosphoric Acid	29 ml.	278 m.
Triple Orange-flower Water ..	25 ml.	½ fl. oz.
Sucrose	700 g.	14 oz.
Distilled Water	.. to 1000 ml.	to 20 fl. oz.

Mix the calcium lactate with 400 millilitres (8 fluid ounces) of the distilled water, add the phosphoric acid, stir until solution is complete, and then add the orange-flower water; dissolve the sucrose in the mixture without the aid of heat, add sufficient distilled water to produce the required volume, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS CALCII LACTOPHOSPHATIS CUM FERRO

(Syr. Calc. Lactophosph. c. Ferr.)

Syrup of Calcium Lactophosphate with Iron

Synonym—Syrupus Ferri et Calcii Lactophosphatis.

	Metric	*Imperial*
Iron Lactate	8·6 g.	75 gr.
Potassium Citrate	8·6 g.	75 gr.
Distilled Water	62·5 ml.	1¼ fl. oz.
Syrup of Calcium Lactophosphate	to 1000 0 ml.	to 20 fl oz.

Dissolve the iron lactate and potassium citrate in the water with the aid of heat, and add the solution quickly to about 900 millilitres (18 fluid ounces) of the syrup of calcium lactophosphate; add sufficient syrup of calcium lactophosphate to produce the required volume, and set the mixture aside until clear.

It should be **stored** in well-filled bottles.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS CAMPHORÆ COMPOSITUS

(Syr. Camph. Co.)

Compound Syrup of Camphor

	Metric	*Imperial*
Camphor	0·46 g.	4 gr.
Oil of Anise	0·42 ml.	4 m.
Benzoic Acid	0·63 g.	5½ gr.
Glacial Acetic Acid	5·7 ml.	55 m.
Tincture of Opium	16·7 ml.	160 m.
Vinegar of Ipecacuanha	62·5 ml.	1¼ fl. oz.
Vinegar of Squill	62·5 ml.	1¼ fl. oz.
Sucrose	700·0 g.	14 oz.
Solution of Burnt Sugar	6·3 ml.	60 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the camphor, oil of anise and benzoic acid in the tincture of opium, mix with the syrup prepared by dissolving the sucrose in 400 millilitres (8 fluid ounces) of hot distilled water and cooling, add the other ingredients and sufficient distilled water to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS CASCARÆ AROMATICUS

(Syr. Casc. Aromat.)

Aromatic Syrup of Cascara

	Metric	*Imperial*
Liquid Extract of Cascara Sagrada	400 ml.	8 fl. oz.
Tincture of Orange	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	50 ml.	1 fl. oz.
Cinnamon Water	150 ml.	3 fl. oz.
Syrup	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

SYRUPUS CERASI
(Syr. Ceras.)
Syrup of Cherry

Press a sufficient quantity of red cherry to yield 400 grammes (8 ounces) of juice; add 600 grammes (12 ounces) of sucrose, dissolve with the aid of heat, cool, replace the water lost by evaporation, and strain.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS CHLORALIS
(Syr. Chloral.)
Syrup of Chloral

	Metric	*Imperial*
Chloral Hydrate	200 g.	4 oz.
Distilled Water	200 ml.	4 fl. oz.
Syrup	..to 1000 ml.	to 20 fl. oz.

Dissolve the chloral hydrate in the distilled water, and add sufficient syrup to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

SYRUPUS CODEINÆ PHOSPHATIS
(Syr. Codein. Phosph.)
Syrup of Codeine Phosphate

	Metric	*Imperial*
Codeine Phosphate	5 g.	43¾ gr.
Distilled Water	20 ml.	192 m.
Syrup	to 1000 ml.	to 20 fl. oz.

Dissolve the codeine phosphate in the distilled water, and add sufficient syrup to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

SYRUPUS CREOSOTI COMPOSITUS
(Syr. Creosot. Co.)
Compound Syrup of Creosote

	Metric	*Imperial*
Creosote	16·7 ml.	160 m.
Spirit of Chloroform	50·0 ml.	1 fl. oz.
Glycerin	333·3 ml.	6 fl. oz. 320 m.
Syrup of Pine	250·0 ml.	5 fl. oz.
Syrup	to 1000·0 ml.	to 20 fl. oz.

Dissolve the creosote in the spirit of chloroform, add to the glycerin and syrup of pine previously mixed, and add sufficient syrup to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS CROCI

(Syr. Croc.)

Syrup of Saffron

	Metric	*Imperial*
Glycerin of Saffron	125 ml.	2½ fl. oz.
Syrup	to 1000 ml.	to 20 fl. oz.

Mix.

It should be **stored** protected from light.

SYRUPUS FERRI BROMIDI

(Syr. Ferr. Brom.)

Syrup of Ferrous Bromide

	Metric	*Imperial*
Iron	25 g.	½ oz.
Bromine	60 g.	1 oz. 87½ gr.
Sucrose	700 g.	14 oz.
Distilled Water	.. to 1000 ml.	to 20 fl. oz.

Dissolve the sucrose in 300 millilitres (6 fluid ounces) of distilled water with the aid of heat. Place the iron with 200 millilitres (4 fluid ounces) of distilled water in a glass flask having a capacity of at least 1000 millilitres (20 fluid ounces), and surround it with cold water. Then add the bromine in successive quantities and shake occasionally until the froth becomes white and the reaction is complete. Filter the solution into the warm syrup, and, if necessary, add sufficient distilled water to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS FERRI BROMIDI CUM QUININA

(Syr. Ferr. Brom. c. Quinin.)

Syrup of Ferrous Bromide with Quinine

	Metric	*Imperial*
Quinine Dihydrobromide ..	20 g.	175 gr.
Dilute Hydrobromic Acid ..	20 ml.	192 m.
Distilled Water	80 ml.	1 fl. oz. 288 m.
Syrup of Ferrous Bromide	.. to 1000 ml.	to 20 fl. oz.

Dissolve the quinine dihydrobromide in the dilute hydrobromic acid and the distilled water with the aid of gentle heat, then add sufficient syrup of ferrous bromide to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS FERRI BROMIDI CUM QUININA ET STRYCHNINA

(Syr. Ferr. Brom. c. Quinin. et Strych.)

Syrup of Ferrous Bromide with Quinine and Strychnine

	Metric	*Imperial*
Strychnine, in powder	0·29 g.	2½ gr.
Quinine Dihydrobromide ..	20·0 g.	175 gr.
Dilute Hydrobromic Acid ..	20·0 ml.	192 m.
Distilled Water	80·0 ml.	1 fl. oz. 288 m.
Syrup of Ferrous Bromide	to 1000·0 ml.	to 20 fl. oz.

Dissolve the strychnine and the quinine dihydrobromide in the dilute hydrobromic acid and the distilled water with the aid of gentle heat, and add sufficient syrup of ferrous bromide to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS FERRI HYPOPHOSPHITIS

(Syr. Ferr. Hypophosph.)

Syrup of Iron Hypophosphite

	Metric	*Imperial*
Solution of Iron Hypophosphite	200 ml.	4 fl. oz.
Syrup	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

SYRUPUS FERRI PHOSPHATIS

(Syr. Ferr. Phosph.)

Syrup of Ferrous Phosphate

	Metric	*Imperial*
Solution of Ferrous Phosphate ..	125 ml.	2½ fl. oz.
Syrup	875 ml.	17½ fl. oz.

Mix.

It should be **stored** in well-filled bottles.

Standard.—Syrup of ferrous phosphate, determined by the method of the British Pharmacopœia for iron in Syrupus Ferri Phosphatis Compositus, using about 10 grammes accurately weighed, contains iron equivalent to not less than 1·7 per cent. and not more than 1·9 per cent. w/v of $Fe_3(PO_4)_2$.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS FICORUM
(Syr. Fic.)
Syrup of Figs

	Metric	*Imperial*
Fig, cut small	400 g.	8 oz.
Sucrose	675 g.	13½ oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Add the fig to 1000 millilitres (20 fluid ounces) of boiling distilled water, and digest at a gentle heat for one hour; then strain, express, and wash the pulp with sufficient warm water to produce 1000 millilitres (20 fluid ounces); evaporate the liquid to one-half its volume, dissolve the sucrose in the concentrated liquid, and add sufficient distilled water to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

SYRUPUS FICORUM COMPOSITUS
(Syr. Fic. Co.)
Compound Syrup of Figs

Synonyms—Syrupus Ficorum Aromaticus; Aromatic Syrup of Figs.

	Metric	*Imperial*
Compound Tincture of Rhubarb	50·0 ml.	1 fl. oz.
Liquid Extract of Senna	100·0 ml.	2 fl. oz.
Elixir of Cascara Sagrada	50·0 ml.	1 fl. oz.
Syrup of Figs	to 1000·0 ml.	to 20 fl. oz.

Mix.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

SYRUPUS GLYCEROPHOSPHATUM COMPOSITUS
(Syr. Glycerophosph. Co.)
Compound Syrup of Glycerophosphates

Synonym—Syrupus Glycerophosphatum Ruber.

	Metric	*Imperial*
Calcium Glycerophosphate	22·9 g.	200 gr.
Magnesium Glycerophosphate	11·4 g.	100 gr.
Iron Glycerophosphate	5·7 g.	50 gr.
Solution of Potassium Glycerophosphate	22·9 g.	200 gr.
Solution of Sodium Glycerophosphate	22·9 g.	200 gr.
Potassium Citrate	11·4 g.	100 gr.
Glycerophosphoric Acid	20·8 ml.	200 m.
Caffeine	5·7 g.	50 gr.
Strychnine	0·2 g.	1¾ gr.
Glycerin	200·0 ml.	4 fl. oz.
Sucrose	400·0 g.	8 oz.
Solution of Bordeaux B	31·2 ml.	300 m.
Chloroform	2·1 ml.	20 m.
Alcohol (90 per cent.)	4·2 ml.	40 m.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the potassium citrate in 350 millilitres (7 fluid ounces) of distilled water, add the solution of potassium glycerophosphate and solution of sodium glycerophosphate, and dissolve the calcium, magnesium and iron glycerophosphates in the mixture. Add the glycerin, the strychnine dissolved in the glycerophosphoric acid, and the caffeine dissolved in 50 millilitres (1 fluid ounce) of hot distilled water. Filter, if necessary, and dissolve the sucrose in the filtrate without the aid of heat. Add the chloroform dissolved in the alcohol, the solution of bordeaux B and sufficient distilled water to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS GLYCEROPHOSPHATUM COMPOSITUS CUM MEDULLA RUBRA

(Syr. Glycerophosph. Co. c. Medull. Rub.)

Compound Syrup of Glycerophosphates with Red Bone Marrow

	Metric	*Imperial*
Compound Syrup of Glycerophosphates	500 ml.	10 fl. oz.
Extract of Red Bone Marrow	500 ml.	10 fl. oz.

Mix.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS GLYCEROPHOSPHATUM CUM FORMATIBUS

(Syr. Glycerophosph. c. Format.)

Syrup of Glycerophosphates with Formates

Synonym—Compound Elixir of Glycerophosphates with Formates.

	Metric	*Imperial*
Calcium Glycerophosphate	17·1 g.	150 gr.
Magnesium Glycerophosphate	8·6 g.	75 gr.
Iron Glycerophosphate	5·7 g.	50 gr.
Solution of Potassium Glycerophosphate	17·1 g.	150 gr.
Solution of Sodium Glycerophosphate	17·1 g.	150 gr.
Potassium Citrate	11·4 g.	100 gr.
Glycerophosphoric Acid	20·8 ml.	200 m.
Potassium Formate	50·0 g.	1 oz.
Sodium Formate	50·0 g.	1 oz.
Strychnine	0·2 g.	1¾ gr.
Glycerin	200·0 ml.	4 fl. oz.
Sucrose	400·0 g.	8 oz.
Double Chloroform Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the potassium citrate in 400 millilitres (8 fluid ounces) of double chloroform water, add the solution of potassium glycerophosphate and solution of sodium glycerophosphate, and dissolve the calcium, magnesium and iron glycerophosphates and the sodium and potassium formates in the mixture. Add the glycerin and the strychnine dissolved in the glycerophosphoric acid, and filter if necessary. Dissolve the sucrose in the filtrate without the aid of heat, and add sufficient double chloroform water to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS GLYCEROPHOSPHATUM ET PEPSINI COMPOSITUS

(Syr. Glycerophosph. et Pepsin. Co.)

Compound Syrup of Glycerophosphates and Pepsin

Synonym—Syrupus Glycerophosphatum Compositus (Robin).

	Metric	*Imperial*
Calcium Glycerophosphate ..	22·9 g.	200 gr.
Magnesium Glycerophosphate ..	11·4 g.	100 gr.
Iron Glycerophosphate	5·7 g.	50 gr.
Solution of Potassium Glycerophosphate	22·9 g.	200 gr.
Solution of Sodium Glycerophosphate	22·9 g.	200 gr.
Glycerophosphoric Acid ..	20·8 ml.	200 m.
Potassium Citrate	11·4 g.	100 gr.
Pepsin	6·9 g.	60 gr.
Caffeine	5·7 g.	50 gr.
Oil of Bitter Almond without Hydrocyanic Acid	0·05 ml.	½ m.
Vanillin	0·2 g.	1¾ gr.
Tincture of Ignatia	31·2 ml.	300 m.
Chloroform	1·0 ml.	10 m.
Solution of Bordeaux B	31·2 ml.	300 m.
Glycerin	200·0 ml.	4 fl. oz.
Sucrose	400·0 g.	8 oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the potassium citrate in 300 millilitres (6 fluid ounces) of distilled water, add the solution of potassium glycerophosphate and solution of sodium glycerophosphate, and dissolve the calcium, magnesium and iron glycerophosphates in the mixture; add the glycerophosphoric

acid and the pepsin, previously dissolved in 50 millilitres (1 fluid ounce) of distilled water. Then add the glycerin and a solution of the caffeine in 50 millilitres (1 fluid ounce) of hot distilled water, filter if necessary, dissolve the sucrose in the filtrate, add the solution of bordeaux B, followed by the chloroform, vanillin and oil of bitter almond dissolved in the tincture of ignatia, and sufficient distilled water to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS GLYCEROPHOSPHATUM FLAVUS

(Syr. Glycerophosph. Flav.)

Yellow Syrup of Glycerophosphates

	Metric	*Imperial*
Calcium Glycerophosphate ..	22·9 g.	200 gr.
Magnesium Glycerophosphate	11·4 g.	100 gr.
Iron Glycerophosphate	5·7 g.	50 gr.
Solution of Potassium Glycerophosphate	22·9 g.	200 gr.
Solution of Sodium Glycerophosphate	22·9 g.	200 gr.
Potassium Citrate	11·4 g.	100 gr.
Glycerophosphoric Acid	20·8 ml.	200 m.
Caffeine	5·7 g.	50 gr.
Glycerin	200·0 ml.	4 fl. oz.
Sucrose	400·0 g.	8 oz.
Vanillin	0·1 g.	1 gr.
Chloroform	2·1 ml.	20 m.
Alcohol (90 per cent.)	4·2 ml.	40 m.
Compound Solution of Tartrazine	10·4 ml.	100 m.
Cinnamon Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the potassium citrate in 350 millilitres (7 fluid ounces) of cinnamon water, add the solution of potassium glycerophosphate and solution of sodium glycerophosphate and dissolve the calcium, magnesium and iron glycerophosphates in the mixture. Add the glycerophosphoric acid, the glycerin, and the caffeine dissolved in 50 millilitres (1 fluid ounce) of hot cinnamon water. Filter, if necessary, and dissolve the sucrose in the filtrate without the aid of heat. Add the vanillin and chloroform dissolved in the alcohol, the compound solution of tartrazine, and sufficient cinnamon water to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS HYPOPHOSPHITUM COMPOSITUS

(Syr. Hypophosph. Co.)

Compound Syrup of Hypophosphites

Synonyms—Syrupus Ferri Hypophosphitis Compositus; Compound Syrup of Iron Hypophosphite.

	Metric	*Imperial*
Calcium Hypophosphite ..	9·1 g.	80 gr.
Manganese Hypophosphite ..	4·6 g.	40 gr.
Potassium Hypophosphite ..	4·6 g.	40 gr.
Quinine	2·2 g.	19 gr.
Strychnine	0·11 g.	1 gr.
Sucrose	700·0 g.	14 oz.
Hypophosphorous Acid ..	12·5 ml.	120 m.
Solution of Iron Hypophosphite	50·0 ml.	1 fl. oz.
Double Chloroform Water	to 1000·0 ml.	to 20 fl. oz.

Triturate the quinine and strychnine with a small quantity of double chloroform water, add the hypophosphorous acid, and when the alkaloids have dissolved, add to the calcium, manganese and potassium hypophosphites previously dissolved in 400 millilitres (8 fluid ounces) of double chloroform water; add the solution of iron hypophosphite, dissolve the sucrose in the liquid without the aid of heat, and add sufficient double chloroform water to produce the required volume; strain through flannel.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS IODOTANNICUS

(Syr. Iodotann.)

Iodotannic Syrup

	Metric	*Imperial*
Iodine	10 g.	87½ gr.
Tannic Acid	10 g.	87½ gr.
Alcohol (90 per cent.)	125 ml.	2½ fl. oz.
Syrup	500 g.	10 oz.
Syrup of Lemon	to 1000 g.	to 20 oz.

Dissolve the iodine in the alcohol, add the tannic acid, the syrup, and 300 grammes (6 ounces) of syrup of lemon, and heat the mixture nearly to boiling until no free iodine can be detected by the starch test; cool, and add sufficient syrup of lemon to produce the required weight.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

SYRUPUS IODOTANNICUS CUM PHOSPHATE

(Syr. Iodotann. c. Phosph.)

Iodotannic Syrup with Phosphate

	Metric	*Imperial*
Calcium Carbonate	15 g.	131¼ gr.
Phosphoric Acid	30 ml.	288 m.
Iodotannic Syrup	to 1000 ml.	to 20 fl. oz.

Mix the calcium carbonate with 300 millilitres (6 fluid ounces) of the iodotannic syrup, add the phosphoric acid, and mix; warm to about 50° to remove the carbon dioxide, stirring thoroughly; cool and add sufficient iodotannic syrup to produce the required volume.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

SYRUPUS IPECACUANHÆ

(Syr. Ipecac.)

Syrup of Ipecacuanha

	Metric	*Imperial*
Vinegar of Ipecacuanha ..	500 ml.	10 fl. oz.
Sucrose	750 g.	15 oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Dissolve the sucrose in the vinegar of ipecacuanha with the aid of gentle heat, and add sufficient distilled water to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

SYRUPUS MARRUBII

(Syr. Marrub.)

Syrup of Horehound

	Metric	*Imperial*
Horehound	425 g.	8½ oz.
Sucrose	850 g.	17 oz.
Distilled Water, boiling ..	a sufficient quantity	

Digest the horehound for one hour, on a water-bath, with sufficient boiling distilled water to cover it, then strain, press, evaporate on the water-bath to about 450 millilitres (9 fluid ounces), cool, and filter. Dissolve the sucrose in the filtrate with the aid of gentle heat, and add sufficient distilled water to yield a syrup having, when cold, a specific gravity of 1·33.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS MENTHÆ PIPERITÆ
(Syr. Menth. Pip.)

Syrup of Peppermint

	Metric	*Imperial*
Concentrated Peppermint Water	125 ml.	2½ fl. oz.
Syrup	875 ml.	17½ fl. oz.

Mix.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

SYRUPUS MORI
(Syr. Mori)

Syrup of Mulberry

	Metric	*Imperial*
Mulberry	a sufficient quantity.	
Alcohol (90 per cent.)	62 5 ml.	1¼ fl. oz.
Sucrose	900·0 g.	18 oz.

Press a sufficient quantity of mulberry to yield 500 millilitres (10 fluid ounces) of juice; heat to boiling-point, cool, and filter. Dissolve the sucrose in the filtrate with the aid of heat, cool, replace the water lost by evaporation and add the alcohol.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS PAPAVERIS
(Syr. Papav.)

Syrup of Poppy

	Metric	*Imperial*
Liquid Extract of Poppy ..	125 ml.	2½ fl. oz.
Syrup	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS PICIS LIQUIDÆ
(Syr. Pic. Liq.)

Syrup of Tar

	Metric	*Imperial*
Tar	5·0 g.	43¾ gr.
Alcohol (90 per cent.).. ..	52·5 ml.	1 fl. oz. 24 m
Sucrose	850 0 g.	17 oz.
Distilled Water ..	to 1000·0 ml.	to 20 fl. oz.

Mix the tar intimately, in a mortar, with 10 grammes (87½ grains) of washed sand, add 100 millilitres (2 fluid ounces) of distilled water, knead the mass thoroughly with the pestle, pour off and reject the aqueous solution, and exhaust the residue with the alcohol; mix 50 grammes (1 ounce) of the sucrose with 10 grammes (87½ grains) of light magnesium carbonate, and triturate the mixture with the alcoholic solution; add 400 millilitres (8 fluid ounces) of distilled water, stir occasionally during two hours, filter, dissolve the remaining sucrose in the filtrate with the aid of gentle heat, strain, and add sufficient distilled water to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS PINI
(Syr. Pini)

Syrup of Pine

	Metric	*Imperial*
Oil of Pumilio Pine	6·25 ml.	60 m.
Alcohol (90 per cent.)	125·0 ml.	2½ fl. oz.
Glycerin	250·0 ml.	5 fl. oz.
Compound Solution of Tartrazine	10·4 ml.	100 m.
Sucrose	500·0 g.	10 oz.
Distilled Water	to 1000·0 ml.	to 20 fl. oz.

Dissolve the oil of pumilio pine in the alcohol, add the glycerin and 25 grammes (½ ounce) of purified talc or kaolin, and add, in small portions, 300 millilitres (6 fluid ounces) of distilled water, shaking between each addition. Filter, dissolve the sucrose in the filtrate with the aid of gentle heat, add the compound solution of tartrazine, and sufficient distilled water to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS PINI ALBI COMPOSITUS
(Syr. Pini Alb. Co.)

Compound Syrup of White Pine

	Metric	*Imperial*
Liquid Extract of White Pine	50 ml.	1 fl. oz.
Liquid Extract of Squill	40 ml.	384 m.
Ammonium Chloride	25 g.	½ oz.
Syrup of Tar	200 ml.	4 fl. oz.
Glycerin	100 ml.	2 fl. oz.
Sucrose	500 g.	10 oz.
Solution of Bordeaux B	5 ml.	48 m.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix the liquid extract of white pine, liquid extract of squill, solution of bordeaux B and ammonium chloride with 300 millilitres (6 fluid ounces) of distilled water, and allow to stand for twenty-four hours. Filter, add the syrup of tar and glycerin, dissolve the sucrose in the product without the aid of heat, add, if necessary, sufficient distilled water to produce the required volume, and strain.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS POTASSII BROMIDI ET PILOCARPINÆ

(Syr. Pot. Brom. et Pilocarp.)

Syrup of Potassium Bromide and Pilocarpine

	Metric	*Imperial*
Potassium Bromide	100·0 g.	2 oz.
Pilocarpine Hydrobromide	0 06 g.	½ gr.
Glycerin	100·0 ml.	2 fl. oz.
Syrup of Orange	to 1000·0 ml.	to 20 fl. oz.

Dissolve the potassium bromide and the pilocarpine hydrobromide in 800 millilitres (16 fluid ounces) of the syrup of orange with the aid of gentle heat, add the glycerin and sufficient syrup of orange to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

SYRUPUS RHAMNI

(Syr. Rham.)

Syrup of Buckthorn

	Metric	*Imperial*
Buckthorn	a sufficient quantity	
Strong Tincture of Ginger	5·2 ml.	50 m.
Oil of Pimento	0·1 ml.	1 m.
Alcohol (90 per cent.)	31·2 ml.	300 m.
Sucrose	650·0 g.	13 oz.
Distilled Water	to 1000·0 g.	to 20 oz.

Press a sufficient quantity of buckthorn to yield 500 millilitres (10 fluid ounces) of juice, and evaporate to 300 millilitres (6 fluid ounces); set aside for twelve hours; filter, dissolve the sucrose in the filtrate with the aid of heat, strain, and cool. Mix the strong tincture of ginger and the oil of pimento with the alcohol, mix the solution with the syrup, and add sufficient distilled water to produce the required weight.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS RHEI
(Syr. Rhei)
Syrup of Rhubarb

	Metric	*Imperial*
Liquid Extract of Rhubarb ..	70·0 ml.	1 fl. oz. 192 m.
Oil of Coriander	0·5 ml.	5 m.
Syrup	to 1000 0 ml.	to 20 fl. oz.

Dissolve the oil of coriander in the liquid extract, and add sufficient syrup to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

SYRUPUS RHŒADOS
(Syr. Rhœad.)
Syrup of Red-Poppy

	Metric	*Imperial*
Red-Poppy Petal, dried ..	52 g.	1 oz. 17½ gr.
Sucrose	720 g.	14 oz. 175 gr.
Alcohol (90 per cent.).. ..	50 ml.	1 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Add the red-poppy petal, gradually, to 400 millilitres (8 fluid ounces) of distilled water kept hot upon a water-bath, stirring frequently, remove the vessel from the water-bath, and infuse for twelve hours; press out the liquid, strain, add the sucrose, and dissolve with the aid of gentle heat; allow to cool, and add the alcohol and sufficient distilled water to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS RIBIS NIGRI
(Syr. Rib. Nig.)
Syrup of Black Currant

	Metric	*Imperial*
Black Currant	a sufficient quantity	
Red Cherry	a sufficient quantity	
Sucrose	600 g.	12 oz.

Press a sufficient quantity of a mixture of 100 parts of black currant and 15 parts of red cherry to yield 400 grammes (8 ounces) of juice; add the sucrose, heat until dissolved, cool, replace the water lost by evaporation, and strain.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS RIBIS RUBRI

(Syr. Rib. Rub.)

Syrup of Red Currant

	Metric	*Imperial*
Red Currant	a sufficient quantity	
Red Cherry	a sufficient quantity	
Sucrose	600 g.	12 oz.

Press a sufficient quantity of a mixture of 100 parts of red currant and 15 parts of red cherry to yield 400 grammes (8 ounces) of juice; add the sucrose, heat until dissolved, cool, replace the water lost by evaporation, and strain.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS ROSÆ

(Syr. Ros.)

Syrup of Rose

	Metric	*Imperial*
Red-Rose Petal, dried	50·0 g.	1 oz.
Dilute Sulphuric Acid	13·5 ml.	130 m.
Sucrose	a sufficient quantity	
Distilled Water, boiling	500·0 ml.	10 fl. oz.

Infuse the red-rose petal in the distilled water for two hours; strain, press, heat the infusion to boiling, filter, add to the filtrate twice its weight of sucrose, and dissolve with the aid of heat; cool, replace the water lost by evaporation, add the dilute sulphuric acid, and mix.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS SUCCI LIMONIS

(Syr. Succ. Limon.)

Syrup of Lemon Juice

	Metric	*Imperial*
Lemon Peel, in thin slices or grated	20 g.	175 gr.
Lemon Juice, fresh	500 ml.	10 fl. oz.
Sucrose	760 g.	15 oz. 87½ gr.
Alcohol (90 per cent.) ..	a sufficient quantity	

Macerate the lemon peel in 30 millilitres (288 minims) of the alcohol for seven days, press, filter, and add sufficient of the alcohol to produce 40 millilitres (384 minims); clarify the lemon juice by subsidence or filtration, add the sucrose, and dissolve with the aid of gentle heat; cool, add the alcoholic liquid, and mix.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS TRIPLEX
(Syr. Trip.)
Triple Syrup

	Metric	*Imperial*
Compound Syrup of Ferrous Phosphate	250 ml.	5 fl. oz.
Compound Syrup of Hypophosphites	250 ml.	5 fl. oz.
Syrup of Ferrous Phosphate with Quinine and Strychnine ..	250 ml.	5 fl. oz.

Mix.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

SYRUPUS TUSSILAGINIS
(Syr. Tussilag.)
Syrup of Coltsfoot

	Metric	*Imperial*
Liquid Extract of Coltsfoot .	250 ml.	5 fl. oz.
Syrup	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

TABELLÆ
Tablets
Synonym—Tablettæ.

Tablets are usually disc-shaped, and consist of substances in moulded or compressed form. **Moulded tablets,** or tablet triturates, are made from fine powders, and generally consist of potent remedies, usually diluted with lactose or dextrose. The powder is moistened with alcohol, moulded into tablets by pressure with a spatula into circular holes in a vulcanite or metal plate, and dried; friable tablets result, which are very readily soluble. This type of tablet is generally used for hypodermic medication.

Compressed tablets consist of medicinal substances, with or without diluent, in a dry, granular condition, compressed by means of punches in suitable dies. The material is granulated by moistening with syrup, mucilage, gelatin solution, water, or by any suitable excipient. The powder should be made coherent, without making it so damp as to adhere to the meshes of a suitable sieve (usually a No. 16) when shaken or gently rubbed through. The granules thus formed are exposed to the air for a few hours, and when thoroughly dry, again passed through a No. 16 sieve, but any fine powder present need not be

sifted from the granules; the material is then ready for compression. It is generally necessary to add a small proportion of lubricant to prevent the granules sticking to the punches or dies. The lubricant may consist of stearic acid, boric acid, liquid paraffin, or oil of theobroma; wherever possible, the use of a lubricant should be avoided. When the tablets are to be crushed to a powder before administration, the addition of a small quantity of starch powder to the material before granulation is desirable, since it ensures a smooth powder free from grittiness. Spontaneous drying of the granules is preferable, but if heat is applied, a temperature of 45° should not be exceeded. Granulation is necessary, as a rule, to secure an easy and uniform flow from the hopper to the die; it also contributes to the production of sound tablets by the interlocking of the granules which takes place on compression. However, such crystalline substances as potassium chlorate and potassium bromide, after passing through a No. 16 sieve, require no other treatment than a little drying before compression.

Compressed tablets are less readily soluble than moulded tablets. When they are composed of insoluble material, it is desirable that they should disintegrate within a reasonable time when dropped into water. This disintegration can be obtained by adding dry starch to the granules before compressing. Half a grain of starch will usually suffice to disintegrate a 5 grain tablet. Tablets composed of readily soluble substances, such as ammonium bromide, hexamine and potassium bromide, should be crushed and dissolved in water before administration.

Chocolate tablets are usually made in the same way as ordinary compressed tablets, but a proportion of sucrose and chocolate powder is added to the medicament before granulation.—

When the proportion of medicament to be contained in each tablet is not stated by the prescriber, the following quantity should be dispensed. The tablets may be made up to any suitable weight with sucrose, chocolate powder, or other inert base, and may, if desired, be sugar, chocolate, pearl, or enteric coated.

Tabellæ Acidi Acetylsalicylici.—Acetylsalicylic acid, 0·3 gramme (5 grains).

Tabellæ Acriflavinæ.—Acriflavine, 0·03 gramme (½ grain), in chocolate basis.

Tabellæ Aloini.—Aloin, 0·03 gramme (½ grain).

Tabellæ Amidopyrinæ.—Amidopyrine, 0·3 gramme (5 grains).

Tabellæ Ammonii Bromidi.—Ammonium bromide, 0·3 gramme (5 grains).

Tabellæ Barbitoni.—Barbitone, 0·3 gramme (5 grains).

Tabellæ Barbitoni Solubilis.—Soluble barbitone, 0·3 gramme (5 grains).

Tabellæ Betanaphtholis.—Betanaphthol, 0·3 gramme (5 grains).

Tabellæ Bismuthi Carbonatis.—Bismuth carbonate, 0·3 gramme (5 grains).

Tabellæ Caffeinæ.—Caffeine, 0·06 gramme (1 grain).

Tabellæ Calcii et Sodii Lactatis.—Calcium sodium lactate, 0·5 gramme (7½ grains).

Tabellæ Calcii Lactatis.—Calcium lactate, 0·3 gramme (5 grains).

Tabellæ Calcis Sulphuratæ. (*Syn.*—Tabellæ Calcii Sulphidi.)—Sulphurated lime, 0·03 gramme (½ grain).

Tabellæ Cascaræ Sagradæ.—Dry extract of cascara sagrada, 0·12 gramme (2 grains).

Tabellæ Cerevisiæ Fermenti.—Dried yeast, 0·3 gramme (5 grains).

Tabellæ Cinchopheni.—Cinchophen, 0·3 gramme (5 grains).

Tabellæ Digitalis Pulveratæ.—Powdered digitalis, 0·06 gramme (1 grain).

Tabellæ Ephedrinæ Hydrochloridi. — Ephedrine hydrochloride, 0·03 gramme (½ grain).

Tabellæ Erythritylis Tetranitratis Diluti. — Diluted erythrityl tetranitrate, 0·06 gramme (1 grain), in chocolate basis.

Tabellæ Euflavinæ.—Euflavine, 0·03 gramme (½ grain), in chocolate basis.

Tabellæ Guaiacolis Carbonatis.—Guaiacol carbonate, 0·3 gramme (5 grains).

Tabellæ Hexaminæ.—Hexamine, 0·3 gramme (5 grains).

Tabellæ Methylsulphonalis. — Methylsulphonal, 0·3 gramme (5 grains).

Tabellæ Methylthioninæ Hydrochloridi. — Methylene blue, 0·12 gramme (2 grains).

Tabellæ Papavereti.—Papaveretum, 0·01 gramme (⅙ grain).

Tabellæ Parathyroidei.—Parathyroid, 0·006 gramme ($\frac{1}{10}$ grain).

Tabellæ Phenacetini.—Phenacetin, 0·3 gramme (5 grains).

Tabellæ Phenazoni.—Phenazone, 0·3 gramme (5 grains).

Tabellæ Phenobarbitoni.—Phenobarbitone, 0·03 gramme (½ grain).

Tabellæ Phenobarbitoni Solubilis.—Soluble phenobarbitone, 0·03 gramme (½ grain).

Tabellæ Phenolphthaleini. — Phenolphthalein, 0·12 gramme (2 grains), in chocolate basis.

Tabellæ Potassii Bromidi.—Potassium bromide, 0·3 gramme (5 grains).

Tabellæ Potassii Chloratis.—Potassium chlorate, 0·3 gramme (5 grains).

Tabellæ Pulveris Ipecacuanhæ et Opii.—Powder of ipecacuanha and opium, 0·3 gramme (5 grains).

Tabellæ Quinidinæ Sulphatis.—Quinidine sulphate, 0·2 gramme (3 grains).

Tabellæ Quininæ.—Quinine sulphate, 0·06 gramme (1 grain).

Tabellæ Saccharini.—Soluble saccharin, 0·02 gramme (⅓ grain).

Tabellæ Salicini.—Salicin, 0·3 gramme (5 grains).

Tabellæ Salolis.—Salol, 0·3 gramme (5 grains).

Tabellæ Santonini.—Santonin, 0·06 gramme (1 grain), in chocolate basis.

Tabellæ Sodii Chaulmoogratis. — Sodium chaulmoograte, 0·3 gramme (5 grains).

Tabellæ Sodii Citratis.—Sodium citrate, 0·12 gramme (2 grains).

Tabellæ Sulphonalis.—Sulphonal, 0·3 gramme (5 grains).

Tabellæ Theobrominæ et Sodii Salicylatis.—Theobromine and sodium salicylate, 0·5 gramme (7½ grains).

TABELLÆ ACETANILIDI COMPOSITÆ

(Tab. Acetanilid. Co.)

Compound Tablets of Acetanilide

	Metric	*Imperial*
Acetanilide	12·96 g.	200 gr.
Caffeine	3·24 g.	50 gr.
Sodium Bicarbonate	6·48 g.	100 gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TABELLÆ ACETANILIDI COMPOSITÆ CUM CODEINA

(Tab. Acetanilid. Co. c. Codein.)

Compound Tablets of Acetanilide with Codeine

	Metric	*Imperial*
Acetanilide	12·96 g.	200 gr.
Caffeine	3·24 g.	50 gr.
Sodium Bicarbonate	6·48 g.	100 gr.
Codeine	1·08 g.	16⅔ gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TABELLÆ ACIDI ACETYLSALICYLICI COMPOSITÆ

(Tab. Acid. Acetylsalicyl. Co.)

Compound Tablets of Acetylsalicylic Acid

Synonym—Compound Aspirin Tablets.

	Metric	*Imperial*
Acetylsalicylic Acid	22·68 g.	350 gr.
Phenacetin	16·20 g.	250 gr.
Caffeine	3·24 g.	50 gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TABELLÆ ACIDI ACETYLSALICYLICI ET CAFFEINÆ

(Tab. Acid. Acetylsalicyl. et Caffein.)

Tablets of Acetylsalicylic Acid and Caffeine

	Metric	*Imperial*
Acetylsalicylic Acid	25·92 g.	400 gr.
Caffeine	6·48 g.	100 gr.

Mix, and make into 100 tablets.

Dose.– 1 to 3 tablets.

TABELLÆ ACIDI ACETYLSALICYLICI ET OPII

(Tab. Acid. Acetylsalicyl. et Opii)

Tablets of Acetylsalicylic Acid and Opium

Synonym—Tablets of Aspirin and Dover's Powder.

	Metric	*Imperial*
Acetylsalicylic Acid	16·20 g.	250 gr.
Powder of Ipecacuanha and Opium	16·20 g.	250 gr.

Mix, and make into 100 tablets.

Dose.– 1 to 3 tablets.

TABELLÆ ACIDI ACETYLSALICYLICI ET OPII COMPOSITÆ

(Tab. Acid. Acetylsalicyl. et Opii Co.)

Compound Tablets of Acetylsalicylic Acid and Opium

	Metric	*Imperial*
Acetylsalicylic Acid	19 44 g.	300 gr.
Phenacetin	8 10 g.	125 gr.
Powder of Ipecacuanha and Opium	6 48 g.	100 gr.

Mix, and make into 100 tablets.

Dose.– 1 to 4 tablets.

TABELLÆ ALOINI COMPOSITÆ
(Tab. Aloin. Co.)

Compound Aloin Tablets

	Metric	*Imperial*
Aloin	1·30 g.	20 gr.
Powdered Ipecacuanha	1·62 g.	25 gr.
Dry Extract of Nux Vomica ..	0·81 g.	12½ gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TABELLÆ BARBITONI ET AMIDOPYRINÆ
(Tab. Barbiton. et Amidopyrin.)

Tablets of Barbitone and Amidopyrine

	Metric	*Imperial*
Barbitone	12·96 g.	200 gr.
Amidopyrine	25·92 g.	400 gr.

Mix, and make into 100 tablets.

Dose.– 1 tablet.

TABELLÆ BISMUTHI ET SODII BICARBONATIS
(Tab. Bism. et Sod. Bicarb.)

Bismuth and Sodium Bicarbonate Tablets

	Metric	*Imperial*
Bismuth Carbonate	12·96 g.	200 gr.
Sodium Bicarbonate	19·44 g.	300 gr.

Mix, and make into 100 tablets.

Dose.– 1 to 3 tablets.

TABELLÆ FERRI CARBONATIS
(Tab. Ferr. Carb.)

Tablets of Iron Carbonate

Synonym—Blaud's Tablets.

	Metric	*Imperial*
Exsiccated Ferrous Sulphate ..	9·72 g.	150 gr.
Sucrose, in powder	8·75 g.	135 gr.
Acacia, in powder	1·62 g.	25 gr.
Sodium Bicarbonate	9·72 g.	150 gr.
Syrup of Liquid Glucose	a sufficient quantity	
Distilled Water	a sufficient quantity	

Mix the exsiccated ferrous sulphate, sucrose and acacia, and granulate with a mixture of 3 parts of syrup of liquid glucose and 1 part of distilled water. Dry the granules with the aid of heat. Granulate the sodium bicarbonate with a sufficient quantity of the mixture of syrup of liquid glucose and distilled water. Dry the granules with the aid of heat, mix them with the granules previously prepared, and make into 100 tablets.

Dose.– 1 to 6 tablets.

TABELLÆ FERRI CARBONATIS ET ALOINI

(Tab. Ferr. Carb. et Aloin.)

Tablets of Iron Carbonate and Aloin

Synonym—Blaud's Tablets with Aloin.

	Metric	*Imperial*
Exsiccated Ferrous Sulphate ..	9·72 g.	150 gr.
Sucrose, in powder	8·75 g.	135 gr.
Acacia, in powder	1·62 g.	25 gr.
Sodium Bicarbonate	9·72 g.	150 gr.
Aloin	0·32 g.	5 gr.
Syrup of Liquid Glucose ..	a sufficient quantity	
Distilled Water	a sufficient quantity	

Mix the exsiccated ferrous sulphate, sucrose and acacia, and granulate with a mixture of 3 parts of syrup of liquid glucose and 1 part of distilled water. Dry the granules with the aid of heat. Granulate the sodium bicarbonate with a sufficient quantity of the mixture of syrup of liquid glucose and distilled water. Dry the granules with the aid of heat, mix them with the granules previously prepared and with the aloin, and make into 100 tablets.

Dose.– 1 to 6 tablets.

TABELLÆ FERRI PHOSPHATIS CUM QUININA ET STRYCHNINA

(Tab. Ferr. Phosph. c. Quinin. et Strych.)

Tablets of Ferrous Phosphate with Quinine and Strychnine

Synonyms—Tabellæ Trium Phosphatum; Easton's Tablets; Tabellæ Eastonii; Tabellæ Ferri et Quininæ et Strychninæ Phosphatum.

	Metric	*Imperial*
Saccharated Iron Phosphate ..	15·23 g.	235 gr.
Strychnine Hydrochloride ..	0·10 g.	1½ gr.
Quinine Sulphate	5·18 g.	80 gr.
Sucrose, in powder	5·18 g.	80 gr.
Potato Starch, in powder ..	1·30 g.	20 gr.
Purified Talc	0·97 g.	15 gr.
Distilled Water	a sufficient quantity	

Triturate the strychnine with the sucrose, and mix it intimately with the quinine sulphate and saccharated iron phosphate, pass the mixed powder through a fine sieve, granulate with the distilled water, dry the granules, mix with the starch and talc, and make into 100 tablets.

Dose.– 1 tablet.

TABELLÆ FORMALDEHYDI
(Tab. Formaldehyd.)

Tablets of Formaldehyde

Synonyms—Formaldehyde and Menthol Tablets; Formalin Throat Tablets; Formamint Tablets.

	Metric	*Imperial*
Paraformaldehyde	0·97 g.	15 gr.
Menthol	0·26 g.	4 gr.
Citric Acid	1·94 g.	30 gr.
Terpeneless Oil of Lemon ..	0·03 ml.	½ m.
Acacia, in powder	9·72 g.	150 gr.
Sucrose, in powder	87·08 g.	3 oz. 30 gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

Note.—The general use of the names "Formalin" and "Formamint" for tablets of formaldehyde is limited to Great Britain and Northern Ireland.

TABELLÆ GUAIACI ET SULPHURIS
(Tab. Guaiac. et Sulphur.)

Tablets of Guaiacum and Sulphur

	Metric	*Imperial*
Guaiacum Resin, in powder ..	19·44 g.	300 gr.
Sublimed Sulphur	19·44 g.	300 gr.

Mix, and make into 100 tablets.

Dose.– 1 to 3 tablets.

TABELLÆ HYPOPHOSPHITUM COMPOSITÆ
(Tab. Hypophosph. Co.)

Compound Tablets of Hypophosphites

	Metric	*Imperial*
Calcium Hypophosphite ..	3·24 g.	50 gr.
Manganese Hypophosphite ..	1·62 g.	25 gr.
Potassium Hypophosphite ..	1·62 g.	25 gr.
Iron Hypophosphite	1·62 g.	25 gr.
Quinine Hypophosphite ..	0·81 g.	12½ gr.
Strychnine	0·04 g.	⅝ gr.
Potato Starch, in powder ..	12·96 g.	200 gr.
Sucrose, in powder	to 22·68 g.	to 350 gr.

Mix the hypophosphites of calcium, manganese and potassium with the strychnine, and grind well together in a mortar. Dissolve the iron hypophosphite in a little water, granulate the mixed powders with the solution, and dry the granules. Pass the dried granules, together with the starch, through a sieve, and make up to the required weight with sucrose. Make into 100 sugar-coated tablets.

Dose.– 1 or 2 tablets.

TABELLÆ LEPTANDRÆ COMPOSITÆ
(Tab. Leptand. Co.)

Compound Tablets of Leptandra

Synonyms—Tabellæ Laxativæ Compositæ; Vegetable Laxative Tablets.

	Metric	*Imperial*
Compound Extract of Colocynth	6·48 g.	100 gr.
Jalap Resin, in powder	1·62 g.	25 gr.
Resin of Podophyllum, in powder	1·62 g.	25 gr.
Extract of Leptandra	1·62 g.	25 gr.
Dry Extract of Hyoscyamus ..	1·62 g.	25 gr.
Extract of Taraxacum	1·62 g.	25 gr.
Oil of Peppermint	0·59 ml.	10 m.

Mix, and make into 100 tablets.

Dose.– 1 to 3 tablets.

TABELLÆ PANCREATINI
(Tab. Pancreatin.)

Pancreatin Tablets

Synonym—Peptonising Tablets.

	Metric	*Imperial*
Pancreatin	16·2 g.	250 gr.
Sodium Bicarbonate	64·8 g.	2 oz. 125 gr.
Sucrose, in powder	16·2 g.	250 gr.
Distilled Water	a sufficient quantity	

Mix, and make into 100 tablets.

TABELLÆ PARATHYROIDEI ET CALCII LACTATIS
(Tab. Parathyroid. et Calc. Lact.)

Tablets of Parathyroid and Calcium Lactate

	Metric	*Imperial*
Parathyroid	0·16 g.	2½ gr.
Calcium Lactate	32·40 g.	1 oz. 62½ gr.

Mix, and make into 100 tablets.

Dose.– 1 to 4 tablets.

TABELLÆ PARATHYROIDEI ET CALCII ET SODII LACTATIS

(Tab. Parathyroid. et Calc. et Sod. Lact.)

Tablets of Parathyroid and Calcium Sodium Lactate

	Metric	*Imperial*
Parathyroid	0·16 g.	2½ gr.
Calcium Sodium Lactate ..	48·60 g.	1 oz. 312½ gr.

Mix, and make into 100 tablets.

Dose.– 1 to 4 tablets.

TABELLÆ PHENACETINI COMPOSITÆ

(Tab. Phenacet. Co.)

Compound Phenacetin Tablets

	Metric	*Imperial*
Phenacetin	25·92 g.	400 gr.
Caffeine	6·48 g.	100 gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TABELLÆ PHENACETINI ET CAFFEINÆ CITRATIS

(Tab. Phenacet. et Caffein. Cit.)

Tablets of Phenacetin and Caffeine Citrate

	Metric	*Imperial*
Phenacetin	25·92 g.	400 gr.
Caffeine Citrate	6·48 g.	100 gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TABELLÆ PHENOBARBITONI ET THEOBROMINÆ

(Tab. Phenobarbiton. et Theobrom.)

Tablets of Phenobarbitone and Theobromine

	Metric	*Imperial*
Phenobarbitone	3·24 g.	50 gr.
Theobromine	32·40 g.	1 oz. 62½ gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TABELLÆ PHENOLPHTHALEINI COMPOSITÆ

(Tab. Phenolphthal. Co.)

Compound Phenolphthalein Tablets

	Metric	*Imperial*
Phenolphthalein	6·48 g.	100 gr.
Dry Extract of Belladonna ..	0 065 g.	1 gr.
Strychnine Sulphate . ..	0·013 g.	$\frac{1}{6}$ gr.

Mix, and make into 100 tablets.

Dose.– 1 to 3 tablets.

TABELLÆ PHOSPHATUM ET HYPOPHOSPHITUM COMPOSITÆ

(Tab. Phosph. et Hypophosph. Co.)

Compound Tablets of Phosphates and Hypophosphites

Synonym—Triple Syrup Tablets.

	Metric	*Imperial*
Saccharated Iron Phosphate ..	7·58 g.	117 gr.
Calcium Phosphate	1·94 g.	30 gr.
Potassium Phosphate	0·13 g.	2 gr.
Sodium Phosphate	0·13 g.	2 gr.
Calcium Hypophosphite ..	1·10 g.	17 gr.
Manganese Hypophosphite ..	0·55 g.	$8\frac{1}{2}$ gr.
Potassium Hypophosphite ..	0·55 g.	$8\frac{1}{2}$ gr.
Iron Hypophosphite	0·55 g.	$8\frac{1}{2}$ gr.
Strychnine	0·049 g.	$\frac{3}{4}$ gr.
Quinine Sulphate	2·00 g.	31 gr.
Potato Starch, in powder	to 19·44 g.	to 300 gr.

Mix, and make into 100 sugar-coated tablets.

Dose.– 1 tablet.

TABELLÆ PLUMBI CUM OPIO

(Tab. Plumb. c. Opio)

Tablets of Lead with Opium

	Metric	*Imperial*
Lead Acetate	19 44 g.	300 gr.
Powdered Opium, in fine powder	3·24 g.	50 gr.
Sucrose, in powder	6·48 g.	100 gr.

Mix, and make into 100 tablets.

Dose.– 1 tablet.

TABELLÆ POTASSII CHLORATIS ET BORACIS
(Tab. Pot. Chlorat. et Borac.)

Tablets of Potassium Chlorate and Borax

	Metric	*Imperial*
Potassium Chlorate	19·44 g.	300 gr.
Borax	12·96 g.	200 gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TABELLÆ RHEI ET SODII BICARBONATIS
(Tab. Rhei et Sod. Bicarb.)

Tablets of Rhubarb and Sodium Bicarbonate

Synonym—Rhubarb and Soda Tablets.

	Metric	*Imperial*
Rhubarb, in powder	19 44 g.	300 gr.
Sodium Bicarbonate	9·72 g.	150 gr.
Ginger, in powder . ..	3·24 g.	50 gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TABELLÆ SANTONINI ET HYDRARGYRI SUBCHLORIDI
(Tab. Santonin. et Hydrarg. Subchlor.)

Tablets of Santonin and Mercurous Chloride

Synonyms—Compound Santonin Tablets; Santonin and Calomel Tablets; Tabellæ Santonini Compositæ.

	Metric	*Imperial*
Santonin	6·48 g.	100 gr.
Mercurous Chloride	6·48 g.	100 gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TABELLÆ SANTONINI ET SCAMMONIÆ COMPOSITÆ
(Tab. Santonin. et Scammon. Co.)

Compound Tablets of Santonin and Scammony

	Metric	*Imperial*
Santonin	9·72 g.	150 gr.
Compound Powder of Scammony	12·96 g.	200 gr.
Mercurous Chloride	3·24 g.	50 gr.

Mix, and make into 100 tablets.

Dose.– 1 tablet.

TABELLÆ SODII BICARBONATIS COMPOSITÆ
(Tab. Sod. Bicarb. Co.)

Compound Tablets of Sodium Bicarbonate

Synonym—Soda Mint Tablets.

	Metric	*Imperial*
Sodium Bicarbonate	32·40 g.	1 oz. 62½ gr.
Ammonium Bicarbonate ..	0·81 g.	12½ gr.
Saccharin	0·13 g.	2 gr.
Oil of Peppermint	0·74 ml.	12½ m.

Granulate the sodium bicarbonate, saccharin and oil of peppermint, mix with the ammonium bicarbonate, and make into 100 tablets.

Dose.– 1 to 4 tablets.

TABELLÆ SODII NITRITIS COMPOSITÆ
(Tab. Sod. Nitrit. Co.)

Compound Tablets of Sodium Nitrite

	Metric	*Imperial*
Sodium Nitrite	3·24 g.	50 gr.
Diluted Erythrityl Tetranitrate	2·16 g.	33⅓ gr.
Ammonium Hippurate	6·48 g.	100 gr.

Mix, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TABELLÆ ZINGIBERIS COMPOSITÆ
(Tab. Zingib. Co.)

Compound Tablets of Ginger

Synonym—Ginger Mint Tablets.

	Metric	*Imperial*
Oleoresin of Ginger	0·16 g.	2½ gr.
Sodium Bicarbonate	32·40 g.	1 oz. 62½ gr.
Ammonium Bicarbonate ..	0·81 g.	12½ gr.
Saccharin	0·13 g.	2 gr.
Oil of Peppermint	0·74 ml.	12½ m.

Granulate the oleoresin of ginger, sodium bicarbonate, saccharin and oil of peppermint, add the ammonium bicarbonate, and make into 100 tablets.

Dose.– 1 or 2 tablets.

TEREBINTHINA VENETA FACTITIA
(Tereb. Venet. Fact.)
Factitious Venice Turpentine

	Metric	*Imperial*
Colophony	625 g.	10 oz.
Linseed Oil	225 g.	3 oz. 262½ gr.
Oil of Turpentine	150 g.	2 oz. 175 gr.

Melt together the colophony and the linseed oil, remove from the source of heat, and stir in the oil of turpentine.

TINCTURÆ
Tinctures

Tinctures are usually alcoholic liquids containing, in comparatively dilute solution, the active principles of vegetable drugs. They are frequently prepared by maceration or by percolation; in other cases they are obtained by dilution of the corresponding liquid extract. The processes of maceration and of percolation to be used in the preparation of tinctures are those described in the British Pharmacopœia. The alcohol content of tinctures is determined by an appropriate method as described in the British Pharmacopœia.

TINCTURA ABSINTHII
(Tinct. Absinth.)
Tincture of Absinthium

	Metric	*Imperial*
Absinthium	100 g.	2 oz.
Alcohol (70 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Alcohol content, 65 to 69 per cent. v/v of ethyl alcohol.

TINCTURA ACONITI
(Tinct. Aconit.)
Tincture of Aconite

	Metric	*Imperial*
Aconite, in moderately fine powder	150 g.	3 oz.
Alcohol (70 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 0·12 to 0·3 millilitre (2 to 5 minims).

Alcohol content, 67 to 69 per cent. v/v of ethyl alcohol.

TINCTURA ACONITI FORTIS
(Tinct. Aconit. Fort.)
Strong Tincture of Aconite

Synonym—Fleming's Tincture of Aconite.

	Metric	*Imperial*
Aconite, in moderately fine powder	700 g.	14 oz.
Alcohol (70 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Alcohol content, 64 to 67 per cent. v/v of ethyl alcohol.

TINCTURA ALOES
(Tinct. Aloes)
Tincture of Aloes

	Metric	*Imperial*
Aloes, crushed	25 g.	½ oz.
Liquid Extract of Liquorice ..	150 ml.	3 fl. oz.
Alcohol (45 per cent.) ..	to 1000 ml.	to 20 fl. oz.

Place the aloes in a closed vessel with 800 millilitres (16 fluid ounces) of the alcohol; set aside for forty-eight hours, occasionally shaking until dissolved; add the liquid extract of liquorice, filter, and pass sufficient of the alcohol through the filter to produce the required volume.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Alcohol content, 38 to 42 per cent. v/v of ethyl alcohol.

TINCTURA ALOES COMPOSITA
(Tinct. Aloes Co.)
Compound Tincture of Aloes

	Metric	*Imperial*
Aloes, crushed	30 g.	262½ gr.
Gentian, cut small and bruised..	5 g.	43¾ gr.
Rhubarb, in moderately coarse powder	5 g.	43¾ gr.
Ginger, in moderately coarse powder	5 g.	43¾ gr.
Alcohol (70 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Alcohol content, 64 to 68 per cent. v/v of ethyl alcohol.

TINCTURA ALOES ET MYRRHÆ
(Tinct. Aloes et Myrrh.)
Tincture of Aloes and Myrrh

Synonym—Elixir Proprietatis.

	Metric	*Imperial*
Aloes, crushed	100 g.	2 oz.
Saffron	50 g.	1 oz.
Tincture of Myrrh	1000 ml.	20 fl. oz.

Macerate for seven days, with frequent agitation, and strain.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Alcohol content, 76 to 79 per cent. v/v of ethyl alcohol.

TINCTURA AMMONIÆ COMPOSITA
(Tinct. Ammon. Co.)
Compound Tincture of Ammonia

Synonym—Eau de Luce.

	Metric	*Imperial*
Mastic	12·5 g.	½ oz.
Alcohol (90 per cent.)	55·0 ml.	1 fl. oz. 48 m.
Oil of Lavender	1·5 ml.	15 m.
Strong Solution of Ammonia	..to 1000 0 ml.	to 20 fl. oz.

Dissolve the mastic in a mixture of the alcohol and 900 millilitres (18 fluid ounces) of strong solution of ammonia, filter if necessary, and add the oil of lavender and sufficient strong solution of ammonia to produce the required volume.

Alcohol content, 4 to 6 per cent. v/v of ethyl alcohol.

TINCTURA ANTIPERIODICA
(Tinct. Antiperiod.)
Antiperiodic Tincture

Synonym—Warburg's Tincture.

	Metric	*Imperial*
Aloes, crushed	27·4 g.	240 gr.
Rhubarb, bruised	9·1 g.	80 gr.
Angelica Fruit, bruised	9·1 g.	80 gr.
Elecampane, bruised	4·6 g.	40 gr.
Saffron	4·6 g.	40 gr.
Fennel, bruised	4·6 g.	40 gr.
Chalk	4·6 g.	40 gr.
Gentian, bruised	2·3 g.	20 gr.
Zedoary, bruised	2·3 g.	20 gr.
Cubeb, bruised	2·3 g.	20 gr.
Myrrh, crushed	2·3 g.	20 gr.
Agaric, in powder	2·3 g.	20 gr.
Powdered Opium	0·3 g.	2½ gr.
Black Pepper, bruised	0·5 g.	4½ gr.
Cinnamon, bruised	0·9 g.	8 gr.
Ginger, bruised	0·9 g.	8 gr.
Quinine Sulphate	20·0 g.	175 gr.
Camphor	2·3 g.	20 gr.
Alcohol (60 per cent.)	to 1000·0 ml.	to 20 fl. oz.

Macerate all the ingredients, except the quinine sulphate and the camphor, with 1000 millilitres (20 fluid ounces) of the alcohol for seven days; then press, filter, dissolve the quinine sulphate and the camphor in the filtrate, set aside for three days, again filter, and add sufficient of the alcohol to produce the required volume.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

Alcohol content, 53 to 57 per cent. v/v of ethyl alcohol.

TINCTURA APOCYNI
(Tinct. Apocyn.)
Tincture of Apocynum

Synonym—Tincture of Canadian Hemp.

	Metric	*Imperial*
Apocynum, in moderately fine powder	100 g.	2 oz.
Alcohol (60 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

Alcohol content, 55 to 58 per cent. v/v of ethyl alcohol.

TINCTURA ARNICÆ FLORIS
(Tinct. Arnic. Flor.)
Tincture of Arnica Flower

	Metric	*Imperial*
Arnica Flower, in moderately coarse powder	100 g.	2 oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 43 to 45 per cent. v/v of ethyl alcohol.

TINCTURA ARNICÆ RADICIS
(Tinct. Arnic. Rad.)
Tincture of Arnica Root

Synonym—Tincture of Arnica.

	Metric	*Imperial*
Arnica Root, in moderately fine powder	50 g.	1 oz.
Alcohol (70 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Alcohol content, 66 to 69 per cent. v/v of ethyl alcohol.

TINCTURA BAPTISIÆ
(Tinct. Baptis.)
Tincture of Baptisia

	Metric	*Imperial*
Baptisia, in moderately coarse powder	100 g.	2 oz.
Alcohol (60 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Alcohol content, 56 to 59 per cent. v/v of ethyl alcohol.

TINCTURA BENZOINI
(Tinct. Benzoin.)
Tincture of Benzoin

Synonym—Simple Tincture of Benzoin.

	Metric	*Imperial*
Benzoin, crushed	100 g.	2 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Macerate the benzoin in 800 millilitres (16 fluid ounces) of the alcohol for one hour, with frequent agitation; then filter, and pass sufficient alcohol through the filter to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 82 to 85 per cent. v/v of ethyl alcohol.

TINCTURA BERBERIDIS
(Tinct. Berber.)
Tincture of Berberis

	Metric	*Imperial*
Berberis, in moderately fine powder	100 g.	2 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 56 to 59 per cent. v/v of ethyl alcohol.

TINCTURA BOLDO
(Tinct. Boldo)
Tincture of Boldo

	Metric	*Imperial*
Boldo, in moderately coarse powder	100 g.	2 oz.
Alcohol (60 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Alcohol content, 56 to 59 per cent. v/v of ethyl alcohol.

TINCTURA BRYONIÆ
(Tinct. Bryon.)
Tincture of Bryony

	Metric	*Imperial*
Bryony, dried and bruised ..	100 g.	2 oz.
Alcohol (60 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 0·06 to 0·6 millilitre (1 to 10 minims).

Alcohol content, 56 to 59 per cent. v/v of ethyl alcohol.

TINCTURA BUCHU
(Tinct. Buchu)
Tincture of Buchu

	Metric	*Imperial*
Buchu, in moderately coarse powder..	200 g.	4 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 55 to 59 per cent. v/v of ethyl alcohol.

TINCTURA CALENDULÆ
(Tinct. Calend.)
Tincture of Calendula

	Metric	*Imperial*
Calendula, in coarse powder ..	200 g.	4 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Alcohol content, 85 to 88 per cent. v/v of ethyl alcohol.

TINCTURA CANNABIS
(Tinct. Cannab.)
Tincture of Cannabis

	Metric	*Imperial*
Extract of Cannabis	50 g.	1 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Dissolve.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Alcohol content, 83 to 87 per cent. v/v of ethyl alcohol.

TINCTURA CAPSICI FORTIOR

(Tinct. Capsic. Fort.)

Stronger Tincture of Capsicum

Synonym—Turnbull's Tincture of Capsicum.

	Metric	*Imperial*
Capsicum, in moderately coarse powder	333 g.	6 oz. 288¾ gr.
Alcohol (60 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 0 06 to 0·2 millilitre (1 to 3 minims).

Alcohol content, 54 to 58 per cent. v/v of ethyl alcohol.

TINCTURA CARDAMOMI AROMATICA

(Tinct. Cardam. Aromat.)

Aromatic Tincture of Cardamom

Synonyms—Tinctura Carminativa; Carminative Tincture.

	Metric	*Imperial*
Cardamom, bruised	68 5 g.	1 oz. 162½ gr.
Strong Tincture of Ginger	62·5 ml.	1¼ fl. oz.
Oil of Caraway	10·4 ml.	100 m.
Oil of Cinnamon	10·4 ml.	100 m.
Oil of Clove	10·4 ml.	100 m.
Alcohol (90 per cent.)	to 1000·0 ml.	to 20 fl. oz.

Macerate the cardamom in 750 millilitres (15 fluid ounces) of the alcohol for seven days, strain, and press the marc. Dissolve the oils in the mixed tinctures, and add sufficient alcohol to produce the required volume.

Dose.– 0·12 to 0·6 millilitre (2 to 10 minims).

Alcohol content, 84 to 88 per cent. v/v of ethyl alcohol.

TINCTURA CASCARILLÆ

(Tinct. Cascaril.)

Tincture of Cascarilla

	Metric	*Imperial*
Cascarilla, in moderately fine powder	200 g.	4 oz.
Alcohol (70 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 64 to 67 per cent. v/v of ethyl alcohol.

TINCTURA CASTOREI
(Tinct. Castor.)

Tincture of Castor

	Metric	*Imperial*
Castor, coarsely powdered ..	50 g.	1 oz.
Alcohol (90 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 86 to 89 per cent. v/v of ethyl alcohol.

TINCTURA CEREI
(Tinct. Cerei)

Tincture of Cereus

Synonym—Tinctura Cacti Grandiflori.

	Metric	*Imperial*
Cereus, in coarse powder ..	250 g.	5 oz.
Alcohol (90 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 0·12 to 2 millilitres (2 to 30 minims).

Alcohol content, 84 to 89 per cent. v/v of ethyl alcohol.

TINCTURA CHIRATÆ
(Tinct. Chirat.)

Tincture of Chiretta

	Metric	*Imperial*
Chiretta, in moderately fine powder	100 g.	2 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 54 to 58 per cent. v/v of ethyl alcohol.

TINCTURA CHLOROFORMI COMPOSITA
(Tinct. Chlorof. Co.)

Compound Tincture of Chloroform

	Metric	*Imperial*
Chloroform	100 ml.	2 fl. oz.
Alcohol (90 per cent.)	400 ml.	8 fl. oz.
Compound Tincture of Cardamom	500 ml.	10 fl. oz.

Mix.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Alcohol content, 62 to 65 per cent. v/v of ethyl alcohol.

TINCTURA CHLOROFORMI ET MORPHINÆ
(Tinct. Chlorof. et Morph.)

Tincture of Chloroform and Morphine

Synonyms—Chlorodyne; Tinct. Chlorof. et Morph., B.P. '85.

	Metric	*Imperial*
Chloroform	125·00 ml.	2½ fl. oz.
Ether	31·25 ml.	300 m.
Alcohol (90 per cent.)	125·00 ml.	2½ fl. oz.
Morphine Hydrochloride ..	2·29 g.	20 gr.
Dilute Hydrocyanic Acid ..	62·50 ml.	1¼ fl. oz.
Oil of Peppermint	1·04 ml.	10 m.
Liquid Extract of Liquorice ..	125·00 ml	2½ fl. oz.
Treacle	125·00 ml.	2½ fl. oz.
Syrup	to 1000·00 ml.	to 20 fl. oz.

Dissolve the morphine hydrochloride and the oil of peppermint in the alcohol (90 per cent.), and add the chloroform and ether. Mix the liquid extract of liquorice and treacle with 400 millilitres (8 fluid ounces) of syrup, add this to the previously formed solution, mix them thoroughly, add the hydrocyanic acid and sufficient syrup to produce the required volume.

Dose.– 0·3 to 0·6 millilitre (5 to 10 minims).

Alcohol content, 12 to 15 per cent. v/v of ethyl alcohol.

TINCTURA CHLOROFORMI ET MORPHINÆ COMPOSITA
(Tinct. Chlorof. et Morph. Co.)

Compound Tincture of Chloroform and Morphine

	Metric	*Imperial*
Chloroform	75 ml.	1½ fl. oz.
Morphine Hydrochloride ..	10 g.	87½ gr.
Dilute Hydrocyanic Acid ..	50 ml.	1 fl. oz.
Tincture of Capsicum	25 ml.	½ fl. oz.
Tincture of Cannabis	100 ml.	2 fl. oz.
Oil of Peppermint	2 ml.	19 m.
Glycerin	250 ml.	5 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix the chloroform, tincture of capsicum, tincture of cannabis, oil of peppermint and glycerin with 450 millilitres (9 fluid ounces) of the alcohol, and dissolve the morphine hydrochloride in the mixture; add the dilute hydrocyanic acid and sufficient alcohol to produce the required volume.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Alcohol content, 52 to 56 per cent. v/v of ethyl alcohol.

TINCTURA CIMICIFUGÆ
(Tinct. Cimicif.)

Tincture of Cimicifuga

Synonym—Tincture of Actæa Racemosa.

	Metric	*Imperial*
Cimicifuga, in moderately coarse powder	100 g.	2 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 56 to 59 per cent. v/v of ethyl alcohol.

TINCTURA CINNAMOMI
(Tinct. Cinnam.)

Tincture of Cinnamon

	Metric	*Imperial*
Cinnamon, in moderately fine powder	200 g.	4 oz.
Alcohol (70 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 65 to 69 per cent. v/v of ethyl alcohol.

TINCTURA CINNAMOMI COMPOSITA
(Tinct. Cinnam. Co.)

Compound Tincture of Cinnamon

	Metric	*Imperial*
Cinnamon, bruised	25·0 g.	½ oz.
Cardamom, bruised	12·5 g.	¼ oz.
Long Pepper, bruised	10·0 g.	87½ gr.
Ginger, bruised	10·0 g.	87½ gr.
Alcohol (60 per cent.)	1000·0 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Alcohol content, 55 to 59 per cent. v/v of ethyl alcohol.

TINCTURA COLLINSONIÆ
(Tinct. Collinson.)
Tincture of Collinsonia

	Metric	*Imperial*
Collinsonia, in moderately coarse powder	100 g.	2 oz.
Alcohol (60 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Alcohol content, 55 to 59 per cent. v/v of ethyl alcohol.

TINCTURA CONVALLARIÆ
(Tinct. Convallar.)
Tincture of Convallaria

	Metric	*Imperial*
Convallaria, in moderately coarse powder	125 g.	2½ oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

Alcohol content, 55 to 58 per cent. v/v of ethyl alcohol.

TINCTURA COTO
(Tinct. Coto)
Tincture of Coto

	Metric	*Imperial*
Coto, bruised	100 g.	2 oz.
Alcohol (90 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Alcohol content, 86 to 89 per cent. v/v of ethyl alcohol.

TINCTURA CUBEBÆ
(Tinct. Cubeb.)
Tincture of Cubeb

	Metric	*Imperial*
Cubeb, in moderately coarse powder	200 g.	4 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 83 to 87 per cent. v/v of ethyl alcohol.

TINCTURA ERGOTÆ AMMONIATA
(Tinct. Ergot. Ammon.)
Ammoniated Tincture of Ergot

	Metric	*Imperial*
Ergot, in moderately coarse powder	250 g.	5 oz.
Dilute Solution of Ammonia	100 ml.	2 fl. oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix the dilute solution of ammonia with 900 millilitres (18 fluid ounces) of the alcohol, moisten the ergot with 100 millilitres (2 fluid ounces) of this mixture, and percolate with the remainder; press the marc, mix the expressed liquid with the percolate, and add sufficient of the alcohol to produce the required volume; set aside for twenty-four hours, and filter.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 51 to 54 per cent. v/v of ethyl alcohol.

TINCTURA EUCALYPTI
(Tinct. Eucalyp.)
Tincture of Eucalyptus

	Metric	*Imperial*
Eucalyptus, in moderately coarse powder	200 g.	4 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 1 to 8 millilitres (¼ to 2 fluid drachms).

Alcohol content, 53 to 58 per cent. v/v of ethyl alcohol.

TINCTURA EUONYMI
(Tinct. Euonym.)

Tincture of Euonymus

	Metric	*Imperial*
Euonymus, in moderately coarse powder	200 g.	4 oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 0·6 to 2·6 millilitres (10 to 40 minims).

Alcohol content, 41 to 44 per cent. v/v of ethyl alcohol.

TINCTURA FERRI PERCHLORIDI
(Tinct. Ferr. Perchlor.)

Tincture of Ferric Chloride

	Metric	*Imperial*
Strong Solution of Ferric Chloride	250 ml.	5 fl. oz.
Alcohol (90 per cent.)	250 ml.	5 fl. oz.
Distilled Water	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Alcohol content, 22 to 24 per cent. v/v of ethyl alcohol.

TINCTURA GALLÆ
(Tinct. Gall.)

Tincture of Gall

	Metric	*Imperial*
Gall, in moderately fine powder	125 g.	2½ oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 8 millilitres (½ to 2 fluid drachms).

Alcohol content, 53 to 57 per cent. v/v of ethyl alcohol.

TINCTURA GELSEMII
(Tinct. Gelsem.)
Tincture of Gelsemium

	Metric	*Imperial*
Gelsemium, in moderately fine powder	100 g.	2 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Alcohol content, 56 to 59 per cent. v/v of ethyl alcohol.

TINCTURA GOSSYPII CORTICIS
(Tinct. Gossyp. Cort.)
Tincture of Cotton Root Bark

	Metric	*Imperial*
Cotton Root Bark, in moderately coarse powder	250 g.	5 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 54 to 58 per cent. v/v of ethyl alcohol.

TINCTURA GUAIACI
(Tinct. Guaiac.)
Tincture of Guaiacum

Synonym—Tincture of Guaiac.

	Metric	*Imperial*
Guaiacum Resin, in powder	200 g.	4 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Macerate the guaiacum resin with 850 millilitres (17 fluid ounces) of the alcohol for forty-eight hours in a closed vessel, shaking frequently; then filter, and pass sufficient of the alcohol through the filter to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 74 to 78 per cent. v/v of ethyl alcohol.

TINCTURA GUAIACI AMMONIATA

(Tinct. Guaiac. Ammon.)

Ammoniated Tincture of Guaiacum

	Metric	*Imperial*
Guaiacum Resin, in powder ..	200 g.	4 oz.
Oil of Nutmeg	3 ml.	29 m.
Oil of Lemon	2 ml.	19 m.
Strong Solution of Ammonia ..	75 ml.	1½ fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix the strong solution of ammonia with 700 millilitres (14 fluid ounces) of the alcohol, add the guaiacum resin, and set aside in a closed vessel for forty-eight hours, shaking occasionally; filter, dissolve the oil of lemon and oil of nutmeg in the filtrate, and pour sufficient of the alcohol through the filter to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 65 to 71 per cent. v/v of ethyl alcohol.

TINCTURA GUARANÆ

(Tinct. Guaran.)

Tincture of Guarana

	Metric	*Imperial*
Guarana, in powder	250 g.	5 oz.
Alcohol (60 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Alcohol content, 54 to 58 per cent. v/v of ethyl alcohol.

TINCTURA HAMAMELIDIS

(Tinct. Hamam.)

Tincture of Hamamelis

	Metric	*Imperial*
Hamamelis Bark, in moderately coarse powder	100 g.	2 oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 41 to 44 per cent. v/v of ethyl alcohol.

TINCTURA HYDRASTIS
(Tinct. Hydrast.)
Tincture of Hydrastis

Synonym—Tinctura Hydrastidis I.A.

	Metric	*Imperial*
Liquid Extract of Hydrastis ..	100 ml.	2 fl. oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 55 to 59 per cent. v/v of ethyl alcohol.

TINCTURA IGNATIÆ
(Tinct. Ignat.)
Tincture of Ignatia

	Metric	*Imperial*
Ignatia, in moderately coarse powder	100 g.	2 oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 0·3 to 1·2 millilitres (5 to 20 minims).

Alcohol content, 86 to 89 per cent. v/v of ethyl alcohol.

TINCTURA JABORANDI
(Tinct. Jaborand.)
Tincture of Jaborandi

	Metric	*Imperial*
Liquid Extract of Jaborandi ..	200 ml.	4 fl. oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Alcohol content, 41 to 44 per cent. v/v of ethyl alcohol.

TINCTURA JALAPÆ
(Tinct. Jalap.)
Tincture of Jalap

	Metric	*Imperial*
Jalap, in moderately fine powder	200 g.	4 oz.
Alcohol (70 per cent.)	a sufficient quantity	

Moisten the jalap with a sufficient quantity of the alcohol, pack in a percolator, and gradually add more of the alcohol until 600 millilitres (12 fluid ounces) of percolate has been collected; press the marc, add the expressed liquid to the percolate, set aside for twenty-four hours, and filter. Determine the proportion of resin in the tincture thus prepared, using 60 millilitres, and dilute the remainder with sufficient of the alcohol to produce a tincture of the required strength.

Standard.—Tincture of jalap, determined by the method of the British Pharmacopœia for Jalapa, commencing with the words "remove most of the alcohol . . ." and using 100 millilitres, contains not less than 1·45 per cent. and not more than 1·55 per cent. w/v of resin.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 65 to 68 per cent. v/v of ethyl alcohol.

TINCTURA JALAPÆ COMPOSITA

(Tinct. Jalap. Co.)

Compound Tincture of Jalap

	Metric	*Imperial*
Jalap, in moderately fine powder	80 g.	1 oz. 262½ gr.
Scammony Resin, in powder ..	15 g.	131¼ gr.
Turpeth, in moderately fine powder	10 g.	87½ gr.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 55 to 58 per cent. v/v of ethyl alcohol.

TINCTURA KINO

(Tinct. Kino)

Tincture of Kino

	Metric	*Imperial*
Kino, in powder	100 g.	2 oz.
Glycerin	150 ml.	3 fl. oz.
Distilled Water	250 ml.	5 fl. oz.
Alcohol (90 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix the glycerin and the distilled water, and triturate the kino in a mortar with a sufficient quantity of the mixture to form a smooth paste, gradually adding the remainder; transfer to a closed vessel, add 500 millilitres (10 fluid ounces) of the alcohol, and set aside for twelve hours, shaking occasionally; then filter, and pass sufficient of the alcohol through the filter to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 44 to 48 per cent. v/v of ethyl alcohol.

TINCTURA KINO EUCALYPTI
(Tinct. Kino Eucalyp.)
Tincture of Eucalyptus Kino

Synonyms—Tinctura Gummi Rubri; Tincture of Red Gum.

	Metric	*Imperial*
Eucalyptus Kino, in powder ..	250 g.	5 oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Macerate the eucalyptus kino with 1000 millilitres (20 fluid ounces) of the alcohol for forty-eight hours, with frequent agitation; then strain, and add sufficient of the alcohol to produce the required volume.

Dose.– 1 to 2·6 millilitres (15 to 40 minims).

Alcohol content, 34 to 38 per cent. v/v of ethyl alcohol.

TINCTURA KOLÆ
(Tinct. Kola)
Tincture of Kola

	Metric	*Imperial*
Liquid Extract of Kola	200 ml.	4 fl. oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Alcohol content, 56 to 59 per cent. v/v of ethyl alcohol.

TINCTURA LAVANDULÆ COMPOSITA
(Tinct. Lavand. Co.)
Compound Tincture of Lavender

	Metric	*Imperial*
Oil of Lavender	5·0 ml.	48 m.
Oil of Rosemary	0·5 ml.	5 m.
Cinnamon, bruised	10·0 g.	87½ gr.
Nutmeg, bruised	10·0 g.	87½ gr.
Red Sanders Wood, rasped ..	20·0 g.	175 gr.
Alcohol (90 per cent.) ..	to 1000·0 ml.	to 20 fl. oz.

Macerate the oil of lavender, oil of rosemary, cinnamon, nutmeg and red sanders wood with 900 millilitres (18 fluid ounces) of the

alcohol in a closed vessel for seven days, shaking occasionally; filter, and pass sufficient of the alcohol through the filter to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 86 to 89 per cent. v/v of ethyl alcohol.

TINCTURA LOBELIÆ SIMPLEX

(Tinct. Lobel. Simp.)

Simple Tincture of Lobelia

Synonym—Tinctura Lobeliæ.

	Metric	*Imperial*
Lobelia, in moderately fine powder	125 g.	2½ oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

Alcohol content, 55 to 59 per cent. v/v of ethyl alcohol.

TINCTURA LUPULI

(Tinct. Lupul.)

Tincture of Lupulus

Synonym—Tincture of Hops.

	Metric	*Imperial*
Lupulus	200 g.	4 oz.
Alcohol (60 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 55 to 59 per cent. v/v of ethyl alcohol.

TINCTURA LYCOPODII

(Tinct. Lycopod.)

Tincture of Lycopodium

	Metric	*Imperial*
Lycopodium	100 g.	2 oz.
Alcohol (90 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 1 to 4 millilitres (¼ to 1 fluid drachm).

Alcohol content, 85 to 89 per cent. v/v of ethyl alcohol.

TINCTURA MYRRHÆ COMPOSITA
(Tinct. Myrrh. Co.)

Compound Tincture of Myrrh

Synonym—Tinctura Myrrhæ et Aloes.

	Metric	*Imperial*
Myrrh, crushed	50 g.	1 oz.
Aloes, crushed	50 g.	1 oz.
Distilled Water	250 ml.	5 fl. oz.
Alcohol (90 per cent.)	750 ml.	15 fl. oz.

Macerate for seven days with frequent agitation, and strain.

Alcohol content, 61 to 65 per cent. v/v of ethyl alcohol.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

TINCTURA MYRRHÆ ET BORACIS
(Tinct. Myrrh. et Borac.)

Tincture of Myrrh and Borax

	Metric	*Imperial*
Tincture of Myrrh	350 ml.	7 fl. oz.
Tincture of Krameria	35 ml.	336 m.
Oil of Bergamot	2 ml.	20 m.
Oil of Lemon	2 ml.	20 m.
Oil of Orange	2 ml.	20 m.
Oil of Neroli	1 ml.	10 m.
Oil of Rosemary	2 ml.	20 m.
Borax, in powder	25 g.	½ oz.
Glycerin	50 ml.	1 fl. oz.
Alcohol (90 per cent.) ..	to 1000 ml.	to 20 fl. oz.

Dissolve the borax in the glycerin with the aid of gentle heat; cool, add the oils dissolved in part of the alcohol, the tincture of myrrh and tincture of krameria, and sufficient of the alcohol to produce the required volume.

Alcohol content, 76 to 80 per cent. v/v of ethyl alcohol.

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, and the tinctures of myrrh and krameria may be replaced by tinctures prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

TINCTURA OPII AMMONIATA

(Tinct. Opii Ammon.)

Ammoniated Tincture of Opium

	Metric	*Imperial*
Tincture of Opium	100 ml.	2 fl. oz.
Benzoic Acid	20 g.	175 gr.
Oil of Anise	5 ml.	48 m.
Dilute Solution of Ammonia ..	200 ml.	4 fl. oz.
Alcohol (90 per cent.) .. .	to 1000 ml.	to 20 fl. oz.

Dissolve the oil of anise and the benzoic acid in 600 millilitres (12 fluid ounces) of the alcohol, add the tincture of opium and the dilute solution of ammonia, mix, filter, and add sufficient of the alcohol to produce the required volume.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 63 to 68 per cent. v/v of ethyl alcohol.

TINCTURA OPII CROCATA

(Tinct. Opii Croc.)

Tincture of Opium with Saffron

Synonym—Sydenham's Laudanum.

	Metric	*Imperial*
Opium, sliced	100 g.	2 oz.
Cinnamon, bruised	10 g.	87½ gr.
Clove, bruised	10 g.	87½ gr.
Saffron	50 g.	1 oz.
Alcohol (20 per cent.)	a sufficient quantity	

Prepare a tincture by the maceration process, using 900 millilitres (18 fluid ounces) of the alcohol. Determine the proportion of morphine in the product, and add sufficient of the alcohol to produce a tincture of the required strength.

Standard.—Tincture of opium with saffron, determined by the method of the British Pharmacopœia for Tinctura Opii, contains not less than 0·95 per cent. and not more than 1·05 per cent. w/v of morphine, calculated as anhydrous.

Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Alcohol content, 15 to 17 per cent. v/v of ethyl alcohol.

TINCTURA PERSIONIS
(Tinct. Pers.)
Tincture of Cudbear

	Metric	*Imperial*
Cudbear, in powder	125 g.	2½ oz.
Alcohol (90 per cent.)	350 ml.	7 fl. oz.
Distilled Water	.. to 1000 ml.	to 20 fl. oz.

Mix the cudbear with 250 grammes (5 ounces) of washed sand, and prepare a tincture by the percolation process, using as menstruum a mixture of the alcohol with 700 millilitres (14 fluid ounces) of distilled water, and adding more distilled water, if necessary, to produce the required volume.

Alcohol content, 28 to 31 per cent. v/v of ethyl alcohol.

TINCTURA PODOPHYLLI
(Tinct. Podoph.)
Tincture of Podophyllum

	Metric	*Imperial*
Resin of Podophyllum	36·5 g.	319½ gr.
Alcohol (90 per cent.) ..	.. to 1000·0 ml.	to 20 fl. oz.

Add the resin of podophyllum to 900 millilitres (18 fluid ounces) of the alcohol, and set aside for twenty-four hours, shaking occasionally; then filter, and pass sufficient of the alcohol through the filter to produce the required volume.

Dose.– 0·3 to 1 millilitre (5 to 15 minims).

Alcohol content, 85 to 88 per cent. v/v of ethyl alcohol.

TINCTURA PODOPHYLLI AMMONIATA
(Tinct. Podoph. Ammon.)
Ammoniated Tincture of Podophyllum

	Metric	*Imperial*
Resin of Podophyllum	20 g.	175 gr.
Aromatic Spirit of Ammonia ..	to 1000 ml.	to 20 fl. oz.

Add the resin of podophyllum to 900 millilitres (18 fluid ounces) of the aromatic spirit of ammonia, and set aside for twenty-four hours, shaking occasionally; filter, and pass sufficient of the aromatic spirit of ammonia through the filter to produce the required volume.

Dose.– 0·6 to 1·2 millilitres (10 to 20 minims).

Alcohol content, 63 to 68 per cent. v/v of ethyl alcohol.

TINCTURA PRUNI SEROTINÆ
(Tinct. Prun. Serot.)
Tincture of Wild Cherry

Synonyms—Tinctura Pruni Virginianæ; Tincture of Virginian Prune.

	Metric	*Imperial*
Wild Cherry Bark, in moderately coarse powder	200 g.	4 oz.
Alcohol (90 per cent.)	565 ml.	11 fl. oz. 144 m.
Distilled Water	365 ml.	7 fl. oz. 144 m.
Glycerin	100 ml.	2 fl. oz.

Mix the wild cherry bark with the distilled water, and set aside in a closed vessel for twenty-four hours; add the alcohol and complete the maceration process, adding the glycerin to the product.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 45 to 50 per cent. v/v of ethyl alcohol.

TINCTURA PULSATILLÆ
(Tinct. Pulsat.)
Tincture of Pulsatilla

	Metric	*Imperial*
Liquid Extract of Pulsatilla ..	100 ml.	2 fl. oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Mix.

Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Alcohol content, 55 to 58 per cent. v/v of ethyl alcohol.

TINCTURA PYRETHRI
(Tinct. Pyreth.)
Tincture of Pyrethrum

	Metric	*Imperial*
Pyrethrum Root, in moderately fine powder	200 g.	4 oz.
Alcohol (70 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Alcohol content, 65 to 69 per cent. v/v of ethyl alcohol.

TINCTURA PYRETHRI FLORIS
(Tinct. Pyreth. Flor.)
Tincture of Pyrethrum Flower

	Metric	*Imperial*
Pyrethrum Flower, in powder ..	250 g.	5 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Alcohol content, 55 to 58 per cent. v/v of ethyl alcohol.

In making this preparation the alcohol (60 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

TINCTURA QUININÆ
(Tinct. Quinin.)
Tincture of Quinine

	Metric	*Imperial*
Quinine Hydrochloride	20 g.	175 gr.
Tincture of Orange	1000 ml.	20 fl. oz.

Dissolve.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 72 to 76 per cent. v/v of ethyl alcohol.

TINCTURA SENNÆ COMPOSITA
(Tinct. Senn. Co.)
Compound Tincture of Senna

	Metric	*Imperial*
Senna Leaf, in moderately coarse powder	200 g.	4 oz.
Caraway, in moderately coarse powder	25 g.	½ oz.
Coriander, in moderately coarse powder	25 g.	½ oz.
Glycerin	100 ml.	2 fl. oz.
Alcohol (45 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare 850 millilitres (17 fluid ounces) of tincture by the percolation process, using the alcohol as menstruum; add the glycerin and sufficient of the alcohol to produce the required volume.

Dose.– For repeated administration, 2 to 4 millilitres (½ to 1 fluid drachm); for a single administration, 8 to 16 millilitres (2 to 4 fluid drachms).

Alcohol content, 35 to 39 per cent. v/v of ethyl alcohol.

TINCTURA SERPENTARIÆ
(Tinct. Serpent.)
Tincture of Serpentary

	Metric	*Imperial*
Serpentary, in moderately fine powder	200 g.	4 oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 56 to 59 per cent. v/v of ethyl alcohol.

TINCTURA SUMBUL
(Tinct. Sumb.)
Tincture of Sumbul

	Metric	*Imperial*
Sumbul, coarsely powdered ..	100 g.	2 oz.
Alcohol (70 per cent.)	1000 ml.	20 fl. oz.

Prepare by the maceration process.

Dose.– 2 to 4 millilitres (½ to 1 fluid drachm).

Alcohol content, 64 to 67 per cent. v/v of ethyl alcohol.

TINCTURA VALERIANÆ SIMPLEX
(Tinct. Valerian. Simp.)
Simple Tincture of Valerian

Synonym—Tinctura Valerianæ.

	Metric	*Imperial*
Valerian, in moderately fine powder	125 g.	2½ oz.
Alcohol (60 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

Alcohol content, 55 to 58 per cent. v/v of ethyl alcohol.

TINCTURA VERATRI
(Tinct. Verat.)
Tincture of Green Hellebore

Synonym—Tincture of Veratrum.

	Metric	*Imperial*
Green Hellebore, in moderately fine powder	100 g.	2 oz.
Alcohol (70 per cent.)	to 1000 ml.	to 20 fl. oz.

Prepare by the percolation process.

Dose.– 0·3 to 2 millilitres (5 to 30 minims).

Alcohol content, 66 to 69 per cent. v/v of ethyl alcohol.

TROCHISCI
Lozenges

Lozenges consist of a flavoured basis with which a medicament is incorporated, and are intended to be dissolved slowly in the mouth. They are generally prepared by mixing the drug, in powder or solution, with sucrose and acacia, then making the mixture into a paste with mucilage of acacia and the other ingredients, dividing the mass into lozenges by means of a suitable apparatus, and drying them in a hot-air chamber at a moderate temperature. The process of manufacture varies somewhat according to the basis employed. The quantities specified in the following formulæ are for one hundred lozenges in each case.

Lozenges with Fruit Basis

	Metric	*Imperial*
Sucrose, finely powdered	5·2 g.	80 gr.
Tragacanth, finely powdered	1·3 g.	20 gr.
Black Currant Paste, of commerce,	to 130·0 g.	to 4 oz. 256 gr.

Mix the drug intimately with the sucrose and tragacanth, and make the mixture into a uniform mass with the black currant paste. Divide into 100 equal lozenges, and dry.

Lozenges with Rose Basis

	Metric	*Imperial*
Sucrose, finely powdered	100·0 g.	3 oz. 231 gr.
Acacia, finely powdered	7·0 g.	108 gr.
Oil of Rose	0·005 ml.	$\frac{1}{10}$ m.
Distilled Water	a sufficient quantity	

Mix the drug intimately with the sucrose and acacia, having previously mixed the sucrose with the oil of rose, and make the mixture into a paste with the distilled water. Divide into 100 equal lozenges, and dry.

Lozenges with Simple Basis

	Metric	*Imperial*
Sucrose, finely powdered ..	100·0 g.	3 oz. 231 gr.
Acacia, finely powdered	7·0 g.	108 gr.
Distilled Water	a sufficient quantity	

Mix the drug intimately with the sucrose and acacia, and make the mixture into a paste with the distilled water. Divide into 100 equal lozenges, and dry.

Lozenges with Tolu Basis

	Metric	*Imperial*
Sucrose, finely powdered ..	100·0 g.	3 oz. 231 gr.
Acacia, finely powdered	7·0 g.	108 gr.
Tincture of Tolu	2·0 ml.	34 m.
Distilled water	a sufficient quantity	

Mix the drug intimately with the sucrose and acacia, previously dissolving any alkaloidal salt ordered in 2 millilitres (34 minims) of distilled water; then add the tincture of tolu, and make the mixture into a paste with the distilled water. Divide into 100 equal lozenges, and dry. This tolu basis has the same composition as the basis employed in the general process for lozenges of the British Pharmacopœia.

Compressed Lozenges

Compressed lozenges can be made by the method described under Tabellæ for compressed tablets. The advantage of avoiding the application of heat is obvious in the case of volatile substances, but strong pressure is necessary, especially for lozenges intended to dissolve slowly.

TROCHISCI ACIDI BENZOICI

(Troch. Acid. Benz.)

Benzoic Acid Lozenges

	Metric	*Imperial*
Benzoic Acid	3·24 g.	50 gr.
Fruit Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI ALKALINI COMPOSITI

(Troch. Alk. Co.)

Compound Alkaline Lozenges

	Metric	*Imperial*
Bismuth Carbonate	9·72 g.	150 gr.
Calcium Carbonate	29·16 g.	450 gr.
Heavy Magnesium Carbonate ..	29·16 g.	450 gr.
Sodium Bicarbonate	9·72 g.	150 gr.
Acacia, finely powdered ..	7·13 g.	110 gr.
Sucrose, finely powdered ..	77·11 g.	2 oz. 315 gr.
Distilled Water	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI AMMONII CHLORIDI COMPOSITI

(Troch. Ammon. Chlorid. Co.)

Compound Ammonium Chloride Lozenges

Synonym—Trochisci Ammonii Chloridi et Glycyrrhizæ.

	Metric	*Imperial*
Ammonium Chloride	19·44 g.	300 gr.
Extract of Liquorice	19·44 g.	300 gr.
Fruit Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI ANTACIDI

(Troch. Antacid.)

Antacid Lozenges

	Metric	*Imperial*
Calcium Carbonate	22·68 g.	350 gr.
Heavy Magnesium Carbonate ..	16·20 g.	250 gr.
Sodium Chloride..	6·48 g.	100 gr.
Simple Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI CATECHU

(Troch. Catech.)

Catechu Lozenges

	Metric	*Imperial*
Catechu, in powder	6·48 g.	100 gr.
Fruit Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI CHLORODYNI

(Troch. Chlorod.)

Chlorodyne Lozenges

	Metric	*Imperial*
Morphine Hydrochloride ..	0·097 g.	1½ gr.
Chloroform	4·44 ml.	75 m.
Ether	0·83 ml.	14 m.
Oil of Peppermint	0·012 ml.	⅕ m.
Tincture of Capsicum	0·10 ml.	1¾ m.
Tragacanth, finely powdered ..	0·05 g.	¾ gr.
Sucrose, finely powdered ..	a sufficient quantity	
Mucilage of Acacia ..	to 156 00 g.	to 5½ oz.

Mix, and make into 100 lozenges.

TROCHISCI FERRI REDACTI

(Troch. Ferr. Redact.)

Reduced Iron Lozenges

	Metric	*Imperial*
Reduced Iron	6·48 g.	100 gr.
Simple Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI GLYCYRRHIZÆ

(Troch. Glycyrrh.)

Liquorice Lozenges

Synonym—Brompton Cough Lozenges.

	Metric	*Imperial*
Extract of Liquorice	19·44 g.	300 gr.
Oil of Anise	2·96 ml.	50 m.
Simple Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI GUAIACI RESINÆ

(Troch. Guaiac. Res.)

Guaiacum Resin Lozenges

	Metric	*Imperial*
Guaiacum Resin, in powder ..	19·44 g.	300 gr.
Fruit Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI IPECACUANHÆ
(Troch. Ipecac.)

Ipecacuanha Lozenges

	Metric	*Imperial*
Powdered Ipecacuanha	1·62 g.	25 gr.
Simple Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI KINO EUCALYPTI
(Troch. Kino Eucalyp.)

Eucalyptus Kino Lozenges

Synonyms—Red Gum Lozenges; Eucalyptus Gum Lozenges.

	Metric	*Imperial*
Eucalyptus Kino, in powder ..	6·48 g.	100 gr.
Fruit Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI MORPHINÆ
(Troch. Morph.)

Morphine Lozenges

	Metric	*Imperial*
Morphine Hydrochloride ..	0·194 g.	3 gr.
Tolu Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI POTASSII CHLORATIS
(Troch. Pot. Chlorat.)

Potassium Chlorate Lozenges

	Metric	*Imperial*
Potassium Chlorate, in powder ..	19·44 g.	300 gr.
Rose Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI SANTONINI

(Troch. Santonin.)

Santonin Lozenges

	Metric	*Imperial*
Santonin, in powder	6·48 g.	100 gr.
Simple Basis	a sufficient quantity	

Mix, and make into 100 lozenges.

TROCHISCI SULPHURIS

(Troch. Sulphur.)

Sulphur Lozenges

	Metric	*Imperial*
Precipitated Sulphur	32·40 g.	1 oz. 62½ gr.
Potassium Acid Tartrate ..	6·48 g.	100 gr.
Sucrose, finely powdered ..	59·40 g.	2 oz. 42 gr.
Acacia, finely powdered ..	6·48 g.	100 gr.
Tincture of Orange	6·48 ml.	110 m.
Mucilage of Acacia	6·48 ml.	110 m.

Mix, and make into 100 lozenges.

UNGUENTA

Ointments

Ointments are semi-solid preparations intended for local application. In tropical and sub-tropical climates varying proportions of fats and waxes may be employed in the preparation of ointments, in order to meet conditions of temperature, but the proportions of the active ingredients must in all cases be maintained. Ointments are usually dispensed in covered pots. For nasal, ophthalmic and rectal use, collapsible tin tubes with applicator nozzles are to be recommended. When a definite quantity of ointment is ordered for inunction, it may be dispensed in graduated tubes, soft gelatin capsules, or in portions wrapped in grease-proof paper.

When a solid substance is to be incorporated in an ointment it should be in the finest possible powder. It should first be mixed with a small portion of the basis which has been previously melted, or, in some cases, with a small quantity of olive oil if the basis is a fatty one which is intended to be absorbed, or with liquid paraffin if not to be absorbed. Trituration should be continued until a smooth paste is obtained, the

remainder of the basis can then be incorporated in increasingly large portions. Caution should be exercised in the use of steel spatulas since, in the presence of moisture, tannic acid, salicylic acid, iodine and mercuric chloride act on the steel.

UNGUENTUM ACIDI BENZOICI COMPOSITUM

(Ung. Acid. Benz. Co.)

Compound Benzoic Acid Ointment

Synonym—Whitfield's Ointment.

	Metric	*Imperial*
Benzoic Acid, finely sifted ..	5·0 g.	87½ gr.
Salicylic Acid, finely sifted ..	3·0 g.	52½ gr.
White Soft Paraffin	27·6 g.	1 oz. 45½ gr.
Coconut Oil	64·4 g.	2 oz. 252 gr.

Add the benzoic and salicylic acids to the soft paraffin and coconut oil, previously melted together at as low a temperature as possible, and stir until cold.

UNGUENTUM ACIDI BORICI FLAVUM

(Ung. Acid. Boric. Flav.)

Yellow Boric Acid Ointment

	Metric	*Imperial*
Boric Acid, finely sifted ..	10 g.	175 gr.
Yellow Soft Paraffin	90 g.	3 oz. 262½ gr.

Triturate the boric acid with a portion of the yellow soft paraffin until smooth; add the remainder, and mix thoroughly.

UNGUENTUM ACONITINÆ

(Ung. Aconitin.)

Aconitine Ointment

	Metric	*Imperial*
Aconitine	2 g.	35 gr.
Oleic Acid	16 g.	280 gr.
Lard	82 g.	3 oz. 122½ gr.

Triturate the aconitine with the oleic acid, gently warm the mixture until the alkaloid is dissolved and mix with the lard.

UNGUENTUM ADIPIS LANÆ

(Ung. Adip. Lan.)

Wool Fat Ointment

Synonyms—Unguentum Lanolini Anhydrosi; Anhydrous Lanolin Ointment.

	Metric	*Imperial*
Wool Fat	50 g.	2 oz.
Yellow Soft Paraffin	50 g.	2 oz.

Mix.

UNGUENTUM ADIPIS LANÆ COMPOSITUM

(Ung. Adip. Lan. Co.)

Compound Wool Fat Ointment

Synonyms—Unguentum Lanæ Compositum; Emollient Ointment.

	Metric	*Imperial*
Lard	40 g.	1 oz. 262½ gr.
Wool Fat	40 g.	1 oz. 262½ gr.
Paraffin Ointment, yellow	20 g.	350 gr.

Melt together, and stir until cold.

UNGUENTUM ADIPIS LANÆ HYDROSI

(Ung. Adip. Lan. Hydros.)

Hydrous Wool Fat Ointment

Synonyms—Unguentum Lanolini; Lanolin Ointment.

	Metric	*Imperial*
Hydrous Wool Fat	50 g.	2 oz.
Yellow Soft Paraffin	50 g.	2 oz.

Mix.

UNGUENTUM ADRENALINÆ

(Ung. Adrenal.)

Adrenaline Ointment

	Metric	*Imperial*
Adrenaline	0·1 g.	1¾ gr.
Boric Acid	0·2 g.	3½ gr.
Distilled Water	3·0 ml.	57¾ m.
Hydrous Wool Fat	50·0 g.	2 oz.
White Soft Paraffin	46·7 g.	1 oz. 379¾ gr.

Dissolve the boric acid in the warmed distilled water, add the adrenaline, mix the solution with the hydrous wool fat, and incorporate the soft paraffin.

UNGUENTUM ADRENALINÆ ET AMYLOCAINÆ COMPOSITUM

(Ung. Adrenal. et Amylocain. Co.)

Compound Ointment of Adrenaline and Amylocaine

	Metric	*Imperial*
Adrenaline	0·007 g.	$\frac{1}{9}$ gr.
Benzoic Acid	0·06 g.	1 gr.
Amylocaine Hydrochloride, finely sifted	1·00 g.	17½ gr.
Benzocaine, finely sifted.. ..	1·00 g.	17½ gr.
Liquid Extract of Hamamelis ..	7·50 ml.	144 m.
Wool Fat	30·00 g.	1 oz. 87½ gr.
Yellow Soft Paraffin ..	to 100·00 g.	to 4 oz.

Dissolve the benzoic acid in the liquid extract of hamamelis, add the adrenaline, and stir until dissolved; mix the solution with the wool fat previously mixed with part of the yellow soft paraffin, then incorporate the powders and sufficient yellow soft paraffin to produce the required weight.

In making this preparation the liquid extract of hamamelis may be replaced by a liquid extract of hamamelis prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

UNGUENTUM ADRENALINÆ ET COCAINÆ

(Ung. Adrenal. et Cocain.)

Adrenaline and Cocaine Ointment

	Metric	*Imperial*
Adrenaline	0·1 g.	1¾ gr.
Boric Acid	0·2 g.	3½ gr.
Cocaine Hydrochloride	1·0 g.	17½ gr.
Distilled Water	3·0 ml.	58 m.
Hydrous Wool Fat	50·0 g.	2 oz.
White Soft Paraffin	45·7 g.	1 oz. 362¼ gr.

Dissolve the boric acid in the warmed distilled water, add the adrenaline and cocaine hydrochloride, mix the solution with the hydrous wool fat, and incorporate the white soft paraffin.

UNGUENTUM AQUÆ ROSÆ
(Ung. Aq. Ros.)

Rose Water Ointment

	Metric	*Imperial*
Rose Water	20·0 ml.	384 m.
White Beeswax	18·0 g.	315 gr.
Borax	1·0 g.	17½ gr.
Almond Oil	61·0 g.	2 oz 192½ gr.
Oil of Rose	0·1 ml.	2 m.

Melt the beeswax in the almond oil and add, with constant stirring, the borax previously dissolved in the rose water; add the oil of rose, and continue to stir until cold.

UNGUENTUM ATROPINÆ
(Ung. Atrop.)

Atropine Ointment

	Metric	*Imperial*
Atropine	1 g.	17½ gr.
White Soft Paraffin	99 g.	3 oz. 420 gr.

Dissolve the atropine in the white soft paraffin with the aid of gentle heat.

UNGUENTUM BELLADONNÆ
(Ung. Bellad.)

Belladonna Ointment

	Metric	*Imperial*
Liquid Extract of Belladonna ..	80 ml.	4 fl. oz.
Benzoinated Lard	60 g.	3 oz.
Wool Fat	20 g.	1 oz.

Evaporate the liquid extract of belladonna on a water-bath until it is reduced to 20 grammes (1 ounce), and mix it with the benzoinated lard and wool fat.

In making this preparation the liquid extract of belladonna may be replaced by a liquid extract of belladonna prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

UNGUENTUM BETANAPHTHOLIS COMPOSITUM

(Ung. Betanaph. Co.)

Compound Betanaphthol Ointment

Synonyms—Kaposi's Compound Ointment; Unguentum Naphthol Compositum; Compound Naphthol Ointment.

	Metric	*Imperial*
Betanaphthol, finely sifted ..	8·57 g.	150 gr.
Chalk, finely sifted	5·71 g.	100 gr
Soft Soap	28·50 g.	1 oz. 61¼ gr
Lard	57·22 g.	2 oz. 126¼ gr.

Mix thoroughly by trituration.

UNGUENTUM BISMUTHI

(Ung. Bism.)

Bismuth Ointment

	Metric	*Imperial*
Bismuth Carbonate	12·5 g.	½ oz
White Soft Paraffin	87·5 g.	3½ oz.

Mix thoroughly by trituration.

UNGUENTUM BISMUTHI OLEATIS

(Ung. Bism. Oleat.)

Bismuth Oleate Ointment

	Metric	*Imperial*
Bismuth Oleate	12·5 g.	½ oz.
White Soft Paraffin	87·5 g.	3½ oz.

Mix thoroughly by trituration.

UNGUENTUM CALAMINÆ

(Ung. Calamin.)

Calamine Ointment

	Metric	*Imperial*
Calamine	16 7 g.	292¼ gr.
Yellow Soft Paraffin	83·3 g.	3 oz. 145¼ gr

Mix thoroughly by trituration.

UNGUENTUM CAMPHORÆ

(Ung. Camph.)

Camphor Ointment

	Metric	Imperial
Camphor, in flowers	10 g.	175 gr.
White Soft Paraffin	90 g.	3 oz. 262½ gr.

Dissolve the camphor in the soft paraffin, previously melted at as low a temperature as possible, and stir until cold.

UNGUENTUM CAMPHORÆ DURUM

(Ung. Camph. Dur.)

Hard Camphor Ointment

Synonym—Camphor Ice.

	Metric	Imperial
Camphor, in flowers	6 g.	105 gr.
Hard Paraffin	26 g.	455 gr.
White Soft Paraffin	68 g.	2 oz. 315 gr.

Dissolve the camphor in the hard and soft paraffins, previously melted at as low a temperature as possible, and stir until cold.

When a harder preparation is required the proportion of hard paraffin may be increased.

UNGUENTUM CANTHARIDINI

(Ung. Cantharidin.)

Cantharidin Ointment

	Metric	Imperial
Cantharidin	0·1 g.	1 gr.
Chloroform	10·0 ml.	110 m.
Benzoinated Lard	290·0 g.	6 oz. 275 gr.

Dissolve the cantharidin in the chloroform; add the solution to the benzoinated lard, previously melted, and stir until cold.

UNGUENTUM CAPSICI COMPOSITUM
(Ung. Capsic. Co.)

Compound Capsicum Ointment

Synonyms—Unguentum Oleoresinæ Capsici Compositum; Compound Capsicum Oleoresin Ointment; Chillie Paste.

	Metric	*Imperial*
Oleoresin of Capsicum	2 g.	35 gr.
Menthol	10 g.	175 gr.
Chloral Hydrate	10 g.	175 gr.
Camphor	10 g.	175 gr.
Yellow Soft Paraffin	68 g.	2 oz. 315 gr.

Dissolve the oleoresin of capsicum in the melted yellow soft paraffin, and incorporate the menthol, chloral hydrate and camphor previously triturated until liquefied.

UNGUENTUM CAPSICI FORTE
(Ung. Capsic. Fort.)

Strong Capsicum Ointment

Synonyms—Unguentum Oleoresinæ Capsici; Capsicum Oleoresin Ointment.

	Metric	*Imperial*
Oleoresin of Capsicum	4·5 g.	78¾ gr.
Yellow Beeswax	9·0 g.	157½ gr.
Benzoinated Lard	86·5 g.	3 oz. 201¼ gr.

Melt the yellow beeswax and benzoinated lard at a low temperature, add the oleoresin of capsicum, mix thoroughly, and stir until cold.

UNGUENTUM CETACEI
(Ung. Cetac.)

Spermaceti Ointment

	Metric	*Imperial*
Spermaceti	20 g.	350 gr.
White Beeswax	8 g.	140 gr.
Liquid Paraffin	to 100 g.	to 4 oz.

Melt together, and stir until cold.

UNGUENTUM CHAULMOOGRÆ
(Ung. Chaulmoog.)

Chaulmoogra Ointment

Synonym—Gynocardia Ointment

	Metric	*Imperial*
Chaulmoogra Oil..	10 g.	175 gr.
Hard Paraffin	40 g.	1 oz. 262½ gr.
White Soft Paraffin	50 g.	2 oz.

Melt the hard and soft paraffins together, add the chaulmoogra oil, and stir until cold.

UNGUENTUM CHRYSAROBINI COMPOSITUM
(Ung. Chrysarob. Co.)

Compound Chrysarobin Ointment

	Metric	*Imperial*
Chrysarobin, finely sifted ..	5 g.	87½ gr.
Ichthammol	5 g.	87½ gr.
Salicylic Acid, finely sifted ..	2 g.	35 gr.
Yellow Soft Paraffin	88 g.	3 oz. 227½ gr.

Mix thoroughly by trituration.

UNGUENTUM COCAINÆ
(Ung. Cocain.)

Cocaine Ointment

	Metric	*Imperial*
Cocaine	4 g.	70 gr.
Oleic Acid	16 g.	280 gr
Lard	80 g.	3 oz. 87½ gr.

Triturate the cocaine with the oleic acid, gently warm the mixture until the alkaloid is dissolved, and mix with the lard

UNGUENTUM COLOPHONII
(Ung. Coloph.)
Colophony Ointment

Synonyms—Unguentum Resinæ; Resin Ointment; Yellow Basilicon Ointment.

	Metric	*Imperial*
Colophony	26 g.	1 oz. 17½ gr.
Yellow Beeswax	26 g.	1 oz. 17½ gr.
Olive Oil	26 g.	1 oz. 17½ gr.
Lard	22 g.	385 gr.

Melt together, strain, and stir until cold.

UNGUENTUM CONII
(Ung. Conii)
Ointment of Conium

Synonym—Hemlock Ointment.

	Metric	*Imperial*
Extract of Conium	7·0 g.	122½ gr.
Glycerin	3·5 ml.	67½ m.
Simple Ointment	89·5 g.	3 oz. 253¾ gr.

Triturate the extract of conium with the glycerin until smooth, and incorporate with the simple ointment.

It should be freshly prepared.

UNGUENTUM CREOSOTI
(Ung. Creosot.)
Creosote Ointment

	Metric	*Imperial*
Creosote	10·0 g.	175 gr.
White Beeswax	7·5 g.	131¼ gr.
Lard	10·0 g.	175 gr.
Hard Paraffin	22·5 g.	393¾ gr.
White Soft Paraffin	50·0 g.	2 oz.

Melt together the beeswax, lard and paraffins, add the creosote, and stir until cold.

UNGUENTUM CRETÆ
(Ung. Cret.)
Chalk Ointment

	Metric	*Imperial*
Chalk, finely sifted	20 g.	350 gr.
Spermaceti Ointment	80 g.	3 oz. 87½ gr.

Mix thoroughly by trituration.

UNGUENTUM CUPRI OLEATIS

(Ung. Cupr. Oleat.)

Copper Oleate Ointment

	Metric	*Imperial*
Copper Oleate	12·5 g.	½ oz.
Yellow Soft Paraffin	87·5 g.	3½ oz.

Melt together on a water-bath, and stir until cold.

UNGUENTUM EPHEDRINÆ

(Ung. Ephed.)

Ephedrine Ointment

	Metric	*Imperial*
Ephedrine	1 g.	17½ gr.
White Soft Paraffin	99 g.	3 oz. 420 gr.

Dissolve with the aid of gentle heat.

UNGUENTUM EUCALYPTI

(Ung. Eucalyp.)

Eucalyptus Ointment

	Metric	*Imperial*
Oil of Eucalyptus	10 g.	175 gr.
Hard Paraffin	40 g.	1 oz. 262½ gr.
White Soft Paraffin	50 g.	2 oz.

Melt together the hard and soft paraffins, add the oil of eucalyptus, and stir until cold.

UNGUENTUM FICARIÆ

(Ung. Ficar.)

Pilewort Ointment

	Metric	*Imperial*
Pilewort	30 g.	1 oz. 87½ gr.
Benzoinated Lard	to 100 g.	to 4 oz.

Cut the pilewort into small pieces, add it to three times its weight of melted benzoinated lard, and allow it to digest at a temperature of about 40° for twenty-four hours; then strain, press, add sufficient benzoinated lard to produce the required weight, and stir until cold.

UNGUENTUM GALLÆ
(Ung. Gall.)
Gall Ointment

	Metric	Imperial
Gall, finely sifted	20 g.	350 gr.
Benzoinated Lard	80 g.	3 oz. 87½ gr.

Mix thoroughly by trituration.

UNGUENTUM GALLÆ CUM OPIO
(Ung. Gall. c. Opio)
Gall and Opium Ointment

Synonym—Unguentum Gallæ Compositum.

	Metric	Imperial
Powdered Opium, in fine powder	7·5 g.	131¼ gr.
Gall Ointment	92·5 g.	3 oz. 306¼ gr.

Mix thoroughly by trituration.

UNGUENTUM GLYCERINI PLUMBI SUBACETATIS
(Ung. Glyc. Plumb. Subacet.)
Glycerin of Lead Subacetate Ointment

	Metric	Imperial
Glycerin of Lead Subacetate ..	16·7 g.	292¼ gr.
Paraffin Ointment, white ..	83·3 g.	3 oz. 145¼ gr.

Mix.

UNGUENTUM HAMAMELIDIS
(Ung. Hamam.)
Hamamelis Ointment

	Metric	Imperial
Liquid Extract of Hamamelis ..	10 ml.	192 m.
Wool Fat	50 g.	2 oz.
Yellow Soft Paraffin	40 g.	1 oz 262½ gr.

Mix by trituration in a warm mortar.

In making this preparation the liquid extract of hamamelis may be replaced by a liquid extract of hamamelis prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

UNGUENTUM HYDRARGYRI AMMONIATI DILUTUM

(Ung. Hydrarg. Ammon. Dil.)

Dilute Ammoniated Mercury Ointment

	Metric	*Imperial*
Ointment of Ammoniated Mercury	50 g.	2 oz.
Simple Ointment	50 g.	2 oz.

Mix.

UNGUENTUM HYDRARGYRI AMMONIATI ET ZINCI OXIDI

(Ung. Hydrarg. Ammon. et Zinc. Oxid.)

Ammoniated Mercury and Zinc Oxide Ointment

	Metric	*Imperial*
Ointment of Ammoniated Mercury	50 g.	2 oz.
Ointment of Zinc Oxide ..	50 g.	2 oz.

Mix.

UNGUENTUM HYDRARGYRI IODIDI RUBRI

(Ung. Hydrarg. Iod. Rub.)

Red Mercuric Iodide Ointment

Synonym—Ointment of Mercuric Iodide.

	Metric	*Imperial*
Red Mercuric Iodide, finely sifted	4 g.	70 gr.
Benzoinated Lard	96 g.	3 oz. 367½ gr.

Mix thoroughly by trituration.

UNGUENTUM HYDRARGYRI OXIDI FLAVI

(Ung. Hydrarg. Oxid. Flav.)

Yellow Mercuric Oxide Ointment

	Metric	*Imperial*
Yellow Mercuric Oxide, in powder	2 g.	35 gr.
Liquid Paraffin	2 g.	35 gr.
Yellow Soft Paraffin	96 g.	3 oz. 367½ gr.

Triturate the yellow mercuric oxide with the liquid paraffin until smooth; gradually add the yellow soft paraffin, mixing thoroughly by trituration.

UNGUENTUM HYDRARGYRI OXIDI FLAVI HUMIDI

(Ung. Hydrarg. Oxid. Flav. Humid.)

Moist Yellow Mercuric Oxide Ointment

	Metric	*Imperial*
Mercuric Chloride	12·50 g.	½ oz.
Sodium Hydroxide	5·416 g.	95 gr.
Distilled Water	a sufficient quantity	
Wool Fat	12·50 g.	½ oz.
Yellow Soft Paraffin	to 100·00 g.	to 4 oz.

Dissolve the mercuric chloride in 400 millilitres (16 fluid ounces) of warm distilled water, dissolve the sodium hydroxide in an equal volume of cold distilled water, filter both solutions, and pour slowly, with constant stirring, the mercuric chloride solution into the sodium hydroxide solution. Set the mixture aside in a dark place until the precipitate has subsided, then decant the clear liquid, and wash the precipitate, by decantation or on a linen filter, with successive portions of warm distilled water, until the washings are free from chloride and alkali. Allow to drain, transfer to a mortar, and incorporate the wool fat and sufficient yellow soft paraffin to produce the required weight. The finished product contains about 10 per cent. of yellow mercuric oxide.

UNGUENTUM HYDRARGYRI OXIDI RUBRI

(Ung. Hydrarg. Oxid. Rub.)

Red Mercuric Oxide Ointment

Synonym- Red Precipitate Ointment.

	Metric	*Imperial*
Red Mercuric Oxide, in powder	10 g.	175 gr.
Paraffin Ointment, yellow ..	90 g.	3 oz. 262½ gr.

Melt the paraffin ointment, sift in the red mercuric oxide, and stir until cold.

UNGUENTUM HYDRARGYRI, PLUMBI ET ZINCI

(Ung. Hydrarg. Plumb. et Zinc.)

Mercury, Lead and Zinc Ointment

Synonym—Unguentum Metallorum.

	Metric	*Imperial*
Strong Ointment of Mercuric Nitrate	30 g.	1 oz.
Lead Subacetate Ointment ..	30 g.	1 oz.
Ointment of Zinc Oxide ..	30 g.	1 oz.

Mix.

UNGUENTUM HYDRARGYRI SUBCHLORIDI COMPOSITUM

(Ung. Hydrarg. Subchlor. Co.)

Compound Mercurous Chloride Ointment

Synonyms—Calomel Cream; Prophylactic Ointment.

	Metric	*Imperial*
Mercurous Chloride	25·0 g.	1 oz.
Mercuric Oxycyanide	0·075 g.	1¼ gr.
Wool Fat	35·0 g.	1 oz. 175 gr.
Yellow Soft Paraffin	25·0 g.	1 oz.
Liquid Paraffin	15·0 g.	262½ gr.

Melt together the wool fat, yellow soft paraffin and liquid paraffin; reduce the mercuric oxycyanide and mercurous chloride to fine powder, and triturate them with a portion of the melted basis until smooth; gradually add the remainder, mixing thoroughly by trituration until cold. (Care should be taken to use dry ingredients and to avoid the inclusion of moisture.)

UNGUENTUM ICHTHAMMOLIS

(Ung. Ichtham.)

Ichthammol Ointment

Synonym—Ammonium Ichthosulphonate Ointment.

	Metric	*Imperial*
Ichthammol	10 g.	175 gr.
Wool Fat Ointment	90 g.	3 oz. 262½ gr.

Mix.

UNGUENTUM ICHTHAMMOLIS COMPOSITUM

(Ung. Ichtham. Co.)

Compound Ichthammol Ointment

Synonym—Compound Ammonium Ichthosulphonate Ointment.

	Metric	*Imperial*
Ichthammol	9 g.	157½ gr.
Precipitated Sulphur, finely sifted	9 g.	157½ gr.
Zinc Oxide, finely sifted ..	9 g.	157½ gr.
Starch, finely sifted	9 g.	157½ gr.
Distilled Water	6 ml.	115 m.
Resorcinol	4 g.	70 gr.
Salicylic Acid, finely sifted ..	2 g.	35 gr.
Betanaphthol, finely sifted ..	2 g.	35 gr.
Wool Fat Ointment	50 g.	2 oz.

Dissolve the resorcinol in the distilled water, incorporate the solution with the wool fat ointment, mix in the ichthammol, and then incorporate the powders, previously mixed.

UNGUENTUM IODI

(Ung. Iod.)

Iodine Ointment

	Metric	*Imperial*
Iodine	4 g.	70 gr.
Potassium Iodide	4 g.	70 gr.
Water	4 ml.	77 m.
Simple Ointment, yellow	88 g.	3 oz. 227½ gr.

Dissolve the iodine and potassium iodide in the distilled water, and mix the solution with the simple ointment.

UNGUENTUM IODI DENIGRESCENS

(Ung. Iod. Denig.)

Non-staining Iodine Ointment.

	Metric	*Imperial*
Iodine	5 g.	87½ gr.
Arachis Oil	15 ml.	288 m.
Yellow Soft Paraffin	to 100 g.	to 4 oz.

Mix the iodine with the arachis oil, add the yellow soft paraffin, and heat gently, with occasional stirring, at a temperature not exceeding 60° until complete combination is effected, as indicated by the disappearance of the brown colour.

UNGUENTUM IODOFORMI

(Ung. Iodof.)

Iodoform Ointment

	Metric	*Imperial*
Iodoform, finely sifted	10 g.	175 gr.
Simple Ointment, yellow	90 g.	3 oz. 262½ gr.

Mix thoroughly by trituration.

It should be **stored** protected from light, and in a cool place.

UNGUENTUM IODOFORMI ET EUÇALYPTI

(Ung. Iodof. et Eucalyp.)

Iodoform and Eucalyptus Ointment

	Metric	*Imperial*
Iodoform	2·00 g.	35 gr.
Oil of Eucalyptus	18·75 g.	¾ oz.
Hard Paraffin .	12·50 g.	½ oz.
Yellow Soft Paraffin	66·75 g.	2 oz. 293 gr.

Heat the iodoform gently with the oil of eucalyptus until solution is effected; add to the hard and soft paraffins previously melted together, and stir until cold.

UNGUENTUM KAOLINI

(Ung. Kaolin.)

Kaolin Ointment

Synonyms—Massa Kaolini; Kaolin Mass.

	Metric	*Imperial*
Kaolin, finely sifted	25 g.	1 oz.
White Soft Paraffin	50 g.	2 oz.
Hard Paraffin	25 g.	1 oz.

Mix the kaolin with the melted hard and soft paraffins, and stir until cold.

UNGUENTUM MERCURIALE

(Ung. Mercur.)

Mercurial Ointment

Synonyms—Unguentum Hydrargyri Mite; Blue Ointment; Trooper's Ointment.

	Metric	*Imperial*
Ointment of Mercury	33 g.	1 oz. 145¾ gr.
Lard	66 g.	2 oz. 291½ gr.

Mix.

UNGUENTUM METHYLIS SALICYLATIS

(Ung. Methyl. Salicyl.)

Methyl Salicylate Ointment

Synonyms—Unguentum Methylis Salicylatis Forte; Strong Methyl Salicylate Ointment.

	Metric	*Imperial*
Methyl Salicylate	50 g.	2 oz.
White Beeswax	25 g.	1 oz.
Hydrous Wool Fat . .	25 g.	1 oz.

Melt together the beeswax and hydrous wool fat, add the methyl salicylate, and stir until cold.

UNGUENTUM METHYLIS SALICYLATIS COMPOSITUM

(Ung. Methyl. Salicyl. Co.)

Compound Methyl Salicylate Ointment

Synonyms—Unguentum Methylis Salicylatis Compositum Forte; Strong Compound Ointment of Methyl Salicylate; Unguentum Betulæ Compositum; Unguentum Analgesicum; Analgesic Balsam.

	Metric	*Imperial*
Methyl Salicylate	50·0 g.	2 oz.
Menthol	10·0 g.	175 gr.
Eucalyptol	2·5 g.	43¾ gr.
Oil of Cajuput	2·5 g.	43¾ gr.
White Beeswax	20·0 g.	350 gr.
Hydrous Wool Fat	15·0 g.	262½ gr.

Melt together the beeswax and hydrous wool fat, add the menthol dissolved in the mixed liquids, and stir until cold.

UNGUENTUM METHYLIS SALICYLATIS COMPOSITUM DILUTUM

(Ung. Methyl. Salicyl. Co. Dil.)

Dilute Compound Methyl Salicylate Ointment

	Metric	*Imperial*
Compound Methyl Salicylate Ointment	25 g.	1 oz.
Hydrous Wool Fat Ointment ..	75 g.	3 oz.

Mix.

UNGUENTUM METHYLIS SALICYLATIS DILUTUM

(Ung. Methyl. Salicyl. Dil.)

Dilute Methyl Salicylate Ointment

	Metric	*Imperial*
Methyl Salicylate Ointment ..	25 g.	1 oz.
Hydrous Wool Fat Ointment ..	75 g.	3 oz.

Mix.

UNGUENTUM OLEI CADINI
(Ung. Ol. Cadin.)

Oil of Cade Ointment

	Metric	*Imperial*
Oil of Cade	25·0 g.	1 oz.
Yellow Beeswax	12·5 g.	½ oz.
Yellow Soft Paraffin	62·5 g.	2½ oz.

Melt together the yellow beeswax and yellow soft paraffin, add the oil of cade, and stir until cold.

UNGUENTUM OLEI COCOIS
(Ung. Ol. Cocois)

Coconut Oil Ointment

	Metric	*Imperial*
Coconut Oil	70 g.	2 oz. 350 gr.
White Soft Paraffin	30 g.	1 oz. 87½ gr.

Mix.

UNGUENTUM PERUVIANUM
(Ung. Peruv.)

Balsam of Peru Ointment

	Metric	*Imperial*
Balsam of Peru	12·5 g.	½ oz.
Simple Ointment, yellow ..	87·5 g.	3½ oz.

Mix.

UNGUENTUM PHENOLIS COMPOSITUM
(Ung. Phenol. Co.)

Compound Phenol Ointment

Synonyms—Unguentum Acidi Carbolici Compositum; Compound Carbolic Acid Ointment.

	Metric	*Imperial*
Phenol	18 g.	318 gr.
Strong Ointment of Mercuric Nitrate	36 g.	1 oz. 199 gr.
Sublimed Sulphur, finely sifted	9 g.	159 gr.
Olive Oil	18 g.	318 gr.
Yellow Beeswax	18 g.	318 gr.

Heat the olive oil with the sulphur until a reddish-brown liquid is obtained, dissolve the beeswax in the mixture, stir until nearly cold, then add the phenol, stir until dissolved, and mix with the strong ointment of mercuric nitrate.

UNGUENTUM PICIS CARBONIS

(Ung. Pic. Carbon.)

Coal Tar Ointment

	Metric	*Imperial*
Solution of Coal Tar	6·25 ml.	120 m.
Yellow Soft Paraffin	93·75 g.	3¾ oz.

Mix.

UNGUENTUM PICIS CARBONIS COMPOSITUM

(Ung. Pic. Carbon. Co.)

Compound Coal Tar Ointment

	Metric	*Imperial*
Solution of Coal Tar	6·25 ml.	120 m.
Ammoniated Mercury	3·12 g.	54¾ gr.
Yellow Soft Paraffin	90·63 g.	3 oz. 273½ gr

Triturate the ammoniated mercury with a portion of the yellow soft paraffin until smooth, mix with the remainder of the yellow soft paraffin, and incorporate the solution of coal tar.

UNGUENTUM PICIS LIQUIDÆ

(Ung. Pic. Liq.)

Tar Ointment

	Metric	*Imperial*
Tar	70 g.	2 oz. 350 gr.
Lard	5 g.	87½ gr.
Yellow Beeswax	25 g.	1 oz.

Melt together, and stir until cold.

UNGUENTUM PLUMBI ACETATIS

(Ung. Plumb. Acet.)

Lead Acetate Ointment

	Metric	*Imperial*
Lead Acetate, finely sifted ..	4 g.	70 gr.
Paraffin Ointment, white ..	96 g.	3 oz. 367½ gr.

Mix thoroughly by trituration.

UNGUENTUM PLUMBI CARBONATIS

(Ung. Plumb. Carb.)

Lead Carbonate Ointment

	Metric	*Imperial*
Lead Carbonate, finely sifted ..	10 g.	175 gr.
Paraffin Ointment, white ..	90 g.	3 oz. 262½ gr.

Mix thoroughly by trituration.

UNGUENTUM PLUMBI IODIDI

(Ung. Plumb. Iod.)

Lead Iodide Ointment

	Metric	*Imperial*
Lead Iodide, finely sifted ..	10 g.	175 gr.
Benzoinated Lard	90 g.	3 oz. 262½ gr.

Mix thoroughly by trituration.

UNGUENTUM PLUMBI OLEATIS

(Ung. Plumb. Oleat.)

Lead Oleate Ointment

Synonyms—Unguentum Diachylon; Diachylon Ointment; Hebra's Ointment.

	Metric	*Imperial*
Plaster of Lead	50 g.	2 oz.
Oil of Lavender	1 g.	17½ gr.
Olive Oil	49 g.	1 oz. 420 gr.

Melt together the plaster of lead and olive oil, stir until cold, and incorporate the oil of lavender.

It should be freshly prepared.

UNGUENTUM PLUMBI SUBACETATIS
(Ung. Plumb. Subacet.)

Lead Subacetate Ointment

	Metric	*Imperial*
Strong Solution of Lead Subacetate	12·5 g.	½ oz.
Wool Fat	25·0 g.	1 oz.
Hard Paraffin	12·5 g.	½ oz.
White Soft Paraffin	50·0 g.	2 oz.

Melt together the wool fat and the hard and soft paraffins, stir until nearly cold, add the strong solution of lead subacetate, and continue stirring until cold.

UNGUENTUM POTASSII IODIDI
(Ung. Pot. Iod.)

Potassium Iodide Ointment

	Metric	*Imperial*
Potassium Iodide	10·0 g.	175 gr.
Potassium Carbonate	0·6 g.	10½ gr.
Distilled Water	9·4 ml.	180½ ml.
Benzoinated Lard	80·0 g.	3 oz. 87½ gr.

Dissolve the potassium iodide and potassium carbonate in the distilled water, and mix the solution gradually with the benzoinated lard in a slightly warmed mortar.

UNGUENTUM POTASSII POLYSULPHIDI
(Ung. Pot. Polysulph.)

Potassium Polysulphide Ointment

Synonyms—Marcussen's Ointment; Danish Ointment.

	Metric	*Imperial*
Potassium Hydroxide	12·5 g.	½ oz.
Sublimed Sulphur	12·5 g.	½ oz.
Yellow Soft Paraffin	22·5 g.	394 gr.
Wool Fat	22·5 g.	394 gr.
Zinc Sulphate	2·8 g.	49 gr.
Sodium Hydroxide	0·8 g.	14 gr.
Distilled Water	15·7 ml.	302 m.
Benzaldehyde	0·5 ml.	10 m.
Liquid Paraffin	to 100·0 g.	to 4 oz.

Dissolve the potassium hydroxide in an equal weight of water, add the sulphur, boil gently until dissolved, and mix the solution with the

yellow soft paraffin and the wool fat. Dissolve the sodium hydroxide in the remainder of the distilled water, add the zinc sulphate, shake well, and incorporate the mixture with the ointment; then add the benzaldehyde and sufficient liquid paraffin to produce the required weight.

UNGUENTUM PYROGALLOLIS
(Ung. Pyrogall.)

Pyrogallol Ointment

Synonyms—Unguentum Acidi Pyrogallici; Pyrogallic Acid Ointment.

	Metric	*Imperial*
Pyrogallol, finely sifted	12·5 g.	½ oz.
White Soft Paraffin	87·5 g.	3½ oz.

Mix thoroughly by trituration.

UNGUENTUM PYROGALLOLIS COMPOSITUM
(Ung. Pyrogall. Co.)

Compound Ointment of Pyrogallol

Synonyms—Unguentum Acidi Pyrogallici Compositum; Compound Pyrogallic Acid Ointment; Unna's Compound Pyrogallol Ointment.

	Metric	*Imperial*
Pyrogallol, finely sifted	5 g.	87½ gr.
Ichthammol	5 g.	87½ gr.
Salicylic Acid, finely sifted ..	2 g.	35 gr.
Yellow Soft Paraffin	88 g.	3 oz. 227½ gr.

Mix thoroughly by trituration.

UNGUENTUM RESORCINOLIS
(Ung. Resorcin.)

Resorcinol Ointment

Synonyms—Unguentum Resorcini; Resorcin Ointment.

	Metric	*Imperial*
Resorcinol	12·5 g.	½ oz.
Glycerin	12·5 g.	½ oz.
Wool Fat	37·5 g.	1½ oz.
White Soft Paraffin	37·5 g.	1½ oz.

Dissolve the resorcinol in the glycerin, mix the solution with the wool fat, and add the soft paraffin.

UNGUENTUM RESORCINOLIS COMPOSITUM

(Ung. Resorcin. Co.)

Compound Resorcinol Ointment

Synonyms—Unguentum Resorcini Compositum; Compound Resorcin Ointment.

	Metric	*Imperial*
Resorcinol	4·0 g.	70 gr.
Distilled Water	4·0 ml.	77 m.
Bismuth Subnitrate, finely sifted	8·0 g.	140 gr.
Zinc Oxide, finely sifted	4·0 g.	70 gr.
Starch, finely sifted	10·0 g.	175 gr.
Birch Tar Oil	3·0 g.	52½ gr.
Wool Fat	10·0 g.	175 gr.
Potassium Pyrosulphite	0·2 g.	3½ gr.
Ceresin, white	2·0 g.	35 gr.
Yellow Soft Paraffin	54 8 g.	2 oz. 84 gr.

Mix the bismuth subnitrate, zinc and starch with a portion of the soft paraffin, then add the wool fat and melted ceresin, to this add the resorcinol and potassium pyrosulphite previously dissolved in the water, lastly add the birch tar oil and the remainder of the soft paraffin.

UNGUENTUM RESORCINOLIS ET BISMUTHI COMPOSITUM

(Ung. Resorcin. et Bism. Co.)

Compound Resorcinol and Bismuth Ointment

Synonyms—Unguentum Resorcini et Bismuthi Compositum; Compound Resorcin and Bismuth Ointment.

	Metric	*Imperial*
Resorcinol	8·0 g.	140 gr.
Distilled Water	12·0 ml.	230½ m.
Zinc Oxide, finely sifted	8·0 g.	140 gr.
Bismuth Subchloride, finely sifted	8·0 g.	140 gr.
Birch Tar Oil	2·5 g.	43¾ gr.
Oil of Cade	2·5 g.	43¾ gr.
Starch, finely sifted	20·0 g.	350 gr.
Wool Fat	39 0 g.	1 oz. 245 gr.

Dissolve the resorcinol in the distilled water, and mix the solution with the bismuth subchloride, zinc oxide and starch to form a smooth cream; mix the birch tar oil and oil of cade with the wool fat, and gradually incorporate the cream.

UNGUENTUM ROSÆ ALBUM

(Ung. Ros. Alb.)

White Rose Ointment

Synonym—Ceratum Galeni.

	Metric	*Imperial*
Triple Rose Water	25·0 ml.	1 fl. oz.
White Beeswax	10·0 g.	175 gr.
Spermaceti	10·0 g.	175 gr.
Oil of Rose	0·1 ml.	2 m.
Almond Oil	54·9 g.	2 oz. 85¾ gr.

Add the rose water gradually, with constant stirring, to the white beeswax and spermaceti previously melted in the almond oil; then add the oil of rose, and continue stirring until cold.

UNGUENTUM RUBRI SCARLATINI

(Ung. Rub. Scarlat.)

Ointment of Scarlet Red

Synonym—Unguentum Rubrum.

	Metric	*Imperial*
Scarlet Red, finely sifted ..	5 g.	87½ gr.
Simple Ointment	95 g.	3 oz. 350 gr.

Mix thoroughly by trituration.

UNGUENTUM RUSCI COMPOSITUM

(Ung. Rusc. Co.)

Compound Birch Tar Ointment

	Metric	*Imperial*
Birch Tar Oil	8 g.	140 gr.
Resorcinol, finely sifted	2 g.	35 gr.
Zinc Oxide, finely sifted ..	24 g.	420 gr.
Starch, finely sifted	24 g.	420 gr.
Hydrous Wool Fat .	20 g.	350 gr.
White Soft Paraffin	22 g.	385 gr.

Mix the resorcinol with the zinc oxide and starch, incorporate with the previously mixed birch tar oil and hydrous wool fat, and then mix with the white soft paraffin.

UNGUENTUM SAMBUCI
(Ung. Sambuc.)

Elder Ointment

	Metric	Imperial
Triple Elder-flower Water ..	20·0 ml.	384 m.
Chlorophyll	0·5 g.	8¾ gr.
Simple Ointment, yellow ..	80·0 g.	3 oz. 87½ gr.

Mix the chlorophyll with the melted simple ointment, gradually add the triple elder-flower water with constant trituration, and continue stirring until cold.

UNGUENTUM STAPHISAGRIÆ
(Ung. Staphisag.)

Stavesacre Ointment

	Metric	Imperial
Stavesacre	20 g.	350 gr.
Yellow Beeswax	10 g.	175 gr.
Benzoinated Lard	85 g.	3 oz. 175 gr.

Crush the stavesacre, and digest it in the benzoinated lard on a water-bath for two hours; strain through calico, melt the beeswax in the liquid mixture, and stir until cold.

UNGUENTUM STRAMONII
(Ung. Stramon.)

Stramonium Ointment

	Metric	Imperial
Extract of Stramonium	10 g.	175 gr.
Alcohol (45 per cent.) .. .	5 ml.	96 m.
Hydrous Wool Fat	20 g.	350 gr.
Benzoinated Lard	65 g.	2 oz. 262½ gr.

Triturate the extract of stramonium with the alcohol until smooth, and incorporate with the hydrous wool fat; add the benzoinated lard, and mix thoroughly.

In making this preparation the alcohol (45 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

UNGUENTUM SULPHURIS CAMPHORATUM

(Ung. Sulphur. Camph.)

Camphorated Sulphur Ointment

	Metric	*Imperial*
Sublimed Sulphur, finely sifted	2 g.	35 gr.
Phenol	3 g.	52½ gr.
Resorcinol, finely sifted	3 g.	52½ gr.
Camphor	3 g.	52½ gr.
Solution of Coal Tar	5 g.	87½ gr.
Lard	42 g.	1 oz. 297½ gr.
White Soft Paraffin	42 g.	1 oz. 297½ gr.

Triturate the sulphur and resorcinol with a portion of the white soft paraffin until smooth, add the remainder of the white soft paraffin and the lard, and incorporate the phenol, camphor and solution of coal tar previously triturated together until liquefied.

UNGUENTUM SULPHURIS COMPOSITUM

(Ung. Sulphur. Co.)

Compound Sulphur Ointment

	Metric	*Imperial*
Sublimed Sulphur, finely sifted	15 g.	¾ oz.
Calcium Carbonate	10 g.	½ oz.
Tar	15 g.	¾ oz.
Lard	30 g.	1½ oz.
Soft Soap	30 g.	1½ oz.

Mix thoroughly the sublimed sulphur and calcium carbonate with the lard and soft soap, and incorporate the tar.

UNGUENTUM SULPHURIS ET RESORCINOLIS

(Ung. Sulphur. et Resorcin.)

Sulphur and Resorcinol Ointment

Synonyms—Unguentum Sulphuris et Resorcini; Sulphur and Resorcin Ointment.

	Metric	*Imperial*
Sublimed Sulphur, finely sifted	4·5 g.	78¾ gr.
Resorcinol, finely sifted	3·0 g.	52½ gr.
Yellow Soft Paraffin	92·5 g.	3 oz. 306¼ gr.

Mix.

UNGUENTUM SULPHURIS HYPOCHLORITIS
(Ung. Sulphur. Hypochlor.)
Sulphur Hypochlorite Ointment

	Metric	*Imperial*
Sublimed Sulphur, finely sifted	12 g.	210 gr.
Sulphur Chloride	2 g.	35 gr.
Oil of Bitter Almond without Hydrocyanic Acid	2 g.	35 gr.
Lard	84 g.	3 oz. 157½ gr.

Mix the sulphur with the lard and the oil of bitter almond, and rapidly incorporate the sulphur chloride.

It should be freshly prepared.

UNGUENTUM SULPHURIS IODIDI
(Ung. Sulphur. Iod.)
Sulphur Iodide Ointment

	Metric	*Imperial*
Sulphur Iodide	4 g.	70 gr.
Glycerin	4 g.	70 gr.
Simple Ointment, yellow ..	92 g.	3 oz. 297½ gr.

Triturate the sulphur iodide and the glycerin in a slightly warmed mortar until a smooth paste results, then gradually add the simple ointment and stir until cold.

UNGUENTUM TRINITROPHENOLIS
(Ung. Trinitrophen.)
Trinitrophenol Ointment

Synonyms—Unguentum Acidi Picrici; Picric Acid Ointment.

	Metric	*Imperial*
Trinitrophenol	2 g.	35 gr.
Distilled Water	2 ml.	38½ m.
Yellow Soft Paraffin	96 g.	3 oz. 367½ gr.

Triturate the trinitrophenol with the water and incorporate the soft paraffin.

UNGUENTUM VERATRINÆ

(Ung. Veratrin.)

Veratrine Ointment

	Metric	*Imperial*
Veratrine	2 g.	35 gr.
Oleic Acid	8 g.	140 gr.
Benzoinated Lard	90 g.	3 oz. 262½ gr.

Triturate the veratrine with the oleic acid, gently warm the mixture until the alkaloid is dissolved and mix with the benzoinated lard.

UNGUENTUM ZINCI CUM BALSAMO PERUVIANO

(Ung. Zinc. c. Bals. Peruv.)

Zinc Ointment with Balsam of Peru

	Metric	*Imperial*
Balsam of Peru	10 g.	½ oz.
Ointment of Zinc Oxide ..	40 g.	2 oz.
Ointment of Boric Acid ..	40 g.	2 oz.

Mix.

UNGUENTUM ZINCI CUM BENZOINO

(Ung. Zinc. c. Benzoin.)

Ointment of Zinc Oxide with Benzoin

	Metric	*Imperial*
Compound Tincture of Benzoin	10 ml.	½ fl. oz.
Ointment of Zinc Oxide ..	70 g.	3½ oz.

Mix.

In making this preparation the compound tincture of benzoin may be replaced by a compound tincture of benzoin prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

UNGUENTUM ZINCI ET OLEI RICINI

(Ung. Zinc. et Ol. Ricin.)

Zinc and Castor Oil Ointment

	Metric	*Imperial*
Zinc Oxide	7·5 g.	131¼ g.
Castor Oil	50·0 g.	2 oz.
Benzoinated Lard	42·5 g.	1 oz. 306¼ gr.

Mix.

UNGUENTUM ZINCI ET OLEI RICINI CUM BENZOINO

(Ung. Zinc. et Ol. Ricin. c. Benzoin.)

Zinc and Castor Oil Ointment with Benzoin

	Metric	*Imperial*
Zinc Oxide	6 g.	116½ gr.
Castor Oil	40 g.	1 oz. 340 gr.
Compound Tincture of Benzoin	10 ml.	213 m.
Benzoinated Lard	34 g.	1 oz. 223½ gr.

Mix.

In making this preparation the compound tincture of benzoin may be replaced by a compound tincture of benzoin prepared with industrial methylated spirit suitably diluted, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

The proportions of zinc oxide and benzoinated lard are equivalent to about 40 per cent. of the zinc ointment of the British Pharmacopœia, 1914.

UNGUENTUM ZINCI MORRHUATIS

(Ung. Zinc. Morrh.)

Zinc Morrhuate Ointment

	Metric	*Imperial*
Cod-liver Oil	14·4 ml.	276½ m.
Zinc Oxide	32·0 g.	1 oz. 122½ gr.
Solution of Calcium Hydroxide	4·8 ml.	92 m.
Wool Fat	3·2 g.	56 gr.
White Soft Paraffin	19·2 g.	336 gr.
White Beeswax	12·8 g.	224 gr.
Purified Talc	12·8 g.	224 gr.
Balsam of Peru	0·8 ml.	15 m.

Mix the cod-liver oil with the solution of calcium hydroxide, triturate the mixture with the zinc oxide to a smooth cream, and set aside for twenty-four hours. Melt together the soft paraffin, beeswax and wool fat, and allow to cool; warm the zinc cream to about the same temperature, mix the two creams, and incorporate the purified talc and the balsam of peru.

VAPORES

Inhalations

Inhalations are liquid preparations containing one or more volatile ingredients which, when inhaled in a suitable manner, are intended to act on the throat, lungs or nasal passages. They may be either dry

or moist inhalations. In dry inhalations, the medicaments are volatile at ordinary temperatures; they are usually directed to be placed on a sponge or absorbent pad in a specially designed oro-nasal respirator, and the vapour inhaled either continuously or at stated intervals. Moist inhalations generally contain volatile oils in an aqueous medium, and are intended to be added to hot water (about 150°F.) in an earthenware or other suitable vessel, and the vapour inhaled for five to ten minutes. The oils should not be suspended, but should be diffused in the medium by the addition of light magnesium carbonate, kaolin, or purified talc, and directions should be given for the bottle to be well shaken before use.

VAPOR CRESOLIS COMPOSITUS

(Vap. Cresol. Co.)

Compound Cresol Inhalation

	Metric	*Imperial*
Creosote	1 ml.	19¼ m.
Oil of Eucalyptus	2 ml.	38½ m.
Oil of Siberian Fir	2 ml.	38½ m.
Cresol	to 100 ml.	to 4 fl. oz.

Mix.

VAPOR EUCALYPTI COMPOSITUS

(Vap. Eucalyp. Co.)

Compound Eucalyptus Inhalation

Synonym—Anti-catarrhal Salts.

	Metric	*Imperial*
Phenol	16·50 g.	288¾ gr.
Oil of Eucalyptus	16·50 ml.	316¾ m.
Oil of Siberian Fir	8·25 ml.	158½ m.
Strong Solution of Iodine	8·25 ml.	158½ m.
Camphor	16·50 g.	288¾ gr.
Ammoniated Alcohol	34 00 ml.	1 oz. 172¾ m.

Dissolve the phenol, camphor and the oils in the ammoniated alcohol, and add the strong solution of iodine. Saturate pine sawdust or peat dust with the mixture, and preserve in glass-stoppered bottles.

In making this preparation the ammoniated alcohol may be replaced by an ammoniated alcohol prepared with industrial methylated spirit, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

VAPOR IODI ÆTHEREUS

(Vap. Iodi Æther.)

Ethereal Inhalation of Iodine

	Metric	*Imperial*
Ethereal Solution of Iodine ..	25·0 ml.	1 fl. oz.
Phenol	25·0 g.	1 fl. oz.
Creosote	12·5 ml.	½ fl. oz.
Alcohol (90 per cent.)	to 100·0 ml.	to 4 fl. oz.

Mix.

Ethereal inhalation of iodine is used on the absorbent pad or sponge of an oro-nasal respirator inhaler. The quantity sufficient for one dry inhalation is 0·6 millilitre (10 minims).

In making this preparation the alcohol (90 per cent.) may be replaced by industrial methylated spirit diluted so as to be of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed.

VAPOR PHENOLIS COMPOSITUS

(Vap. Phenol. Co.)

Compound Phenol Inhalation

Synonyms—Vapor Acidi Carbolici Compositus; Compound Carbolic Acid Inhalation.

	Metric	*Imperial*
Creosote	1 ml.	19¼ m.
Oil of Eucalyptus	2 ml.	38½ m.
Oil of Siberian Fir	2 ml.	38½ m.
Liquefied Phenol	to 100 ml.	to 4 fl. oz.

Mix.

VINUM ALOES

(Vin. Aloes)

Aloes Wine

	Metric	*Imperial*
Aloes, coarsely powdered ..	37·50 g.	¾ oz.
Cardamom, bruised	4·57 g.	40 gr.
Ginger, coarsely powdered ..	4·57 g.	40 gr.
Sherry-type Wine ..	to 1000·00 ml.	to 20 fl. oz.

Macerate the aloes, cardamom and ginger in 1000 millilitres (20 fluid ounces) of the sherry-type wine for seven days, with occasional agitation, filter the liquid, and add sufficient sherry-type wine to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms)

VINUM ANTIMONIALE
(Vin. Antim.)

Antimonial Wine

	Metric	*Imperial*
Potassium Antimonyltartrate ..	4 g.	35 gr.
Distilled Water, boiling	40 ml.	384 m.
Sherry-type Wine	to 1000 ml.	to 20 fl. oz.

Dissolve the potassium antimonyltartrate in the distilled water, and add sufficient sherry-type wine to produce the required volume.

Dose.– 0·6 to 2 millilitres (10 to 30 minims); as an emetic, 8 to 16 millilitres (2 to 4 fluid drachms).

VINUM COLCHICI
(Vin. Colch.)

Colchicum Wine

	Metric	*Imperial*
Colchicum Corm, in moderately coarse powder	200 g.	4 oz.
Sherry-type Wine	1000 ml.	20 fl. oz.

Macerate the colchicum corm with the wine in a covered vessel for seven days, shaking occasionally, strain, press the marc, mix the two liquids, and clarify by subsidence or clarification.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

VINUM COLCHICI SEMINIS
(Vin. Colch. Sem.)

Colchicum Seed Wine

	Metric	*Imperial*
Colchicum Seed, in moderately coarse powder	100 g.	2 oz.
Detannated Sherry-type Wine ..	1000 ml.	20 fl. oz.

Macerate the colchicum seed with the wine in a covered vessel for seven days, shaking occasionally, strain, press the marc, mix the two liquids, and clarify by subsidence or clarification.

Dose.– 0·6 to 2 millilitres (10 to 30 minims).

VINUM FERRI
(Vin. Ferr.)
Iron Wine

	Metric	*Imperial*
Iron	50 g.	1 oz.
Sherry-type Wine	1000 ml.	20 fl. oz.

Partially immerse the iron in the sherry-type wine in a closed vessel, and continue the maceration until the filtered liquid responds to the following test:—Evaporate 50 millilitres to dryness, incinerate the residue, heat the ash with hydrochloric acid diluted with an equal volume of distilled water, filter, wash the filter paper with distilled water, and add to the mixed filtrate and washings excess of solution of ammonia. Collect the precipitate, wash, dry and ignite; the residue weighs not less than 0·089 and not more than 0·215 gramme, representing a proportion of not less than 0·125 per cent. and not more than 0·300 per cent. w/v of Fe.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

VINUM FERRI CITRATIS
(Vin. Ferr. Cit.)
Iron Citrate Wine

	Metric	*Imperial*
Iron and Ammonium Citrate ..	18 g.	157½ gr.
Orange Wine	to 1000 ml.	to 20 fl. oz.

Dissolve, shake occasionally for three days, and filter.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

VINUM FERRI ET QUININÆ
(Vin. Ferr. et Quinin.)
Iron and Quinine Wine

	Metric	*Imperial*
Iron and Quinine Citrate ..	20 g.	175 gr.
Sherry-type Wine	1000 ml.	20 fl. oz.

Add the iron and quinine citrate to the sherry-type wine, set aside for three days, shaking occasionally, and filter.

Dose.– 4 to 16 millilitres (1 to 4 fluid drachms).

VINUM PEPSINI
(Vin. Pepsin.)
Pepsin Wine

	Metric	*Imperial*
Pepsin	36·6 g.	320 gr.
Hydrochloric Acid	12·5 ml.	120 m.
Glycerin	50·0 ml.	1 fl. oz.
Detannated Sherry-type Wine	to 1000·0 ml.	to 20 fl. oz.

Triturate the pepsin with the glycerin, and add gradually, with constant stirring, a mixture of the hydrochloric acid and 900 millilitres (18 fluid ounces) of the sherry-type wine; set aside for seven days, filter, and add sufficient of the sherry-type wine to produce the required volume.

Dose.– 4 to 8 millilitres (1 to 2 fluid drachms).

VINUM QUININÆ
(Vin. Quinin.)
Quinine Wine

	Metric	*Imperial*
Quinine Hydrochloride	2·3 g.	20 gr.
Orange Wine	1000·0 ml.	20 fl. oz.

Dissolve, and filter if necessary.

Dose.– 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce).

VINUM XERICUM DETANNATUM
(Vin. Xeric. Detann.)
Detannated Sherry-type Wine

	Metric	*Imperial*
Sherry-type Wine	1000·0 ml.	20 fl. oz.
Gelatin, in fine powder	1·5 g.	13 gr.

Macerate for twenty-four hours, at a temperature not exceeding 15·5°, with frequent agitation, and afterwards decant.

PART IV
APPENDICES

The British Pharmaceutical Codex

PART IV

APPENDICES

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APPENDIX I

Weights and Measures of the British Pharmaceutical Codex

IMPERIAL WEIGHTS AND MEASURES

Measures of Length

1 Inch	=	25·3999 millimetres
1 Foot (12 inches)	=	304·7997 millimetres 0·3047997 metre
1 Yard (3 feet)	=	914·3992 millimetres 0·9143992 metre

Weights or Measures of Mass

1 Grain (gr.)	=	0·0648 gramme nearly 64·7989 milligrams
1 Scruple (20 grains)	=	1·2959 grammes
1 Drachm (3 scruples or 60 grains) (dr.)	=	3·8879 grammes
1 Troy or Apothecaries' Ounce (8 drachms or 480 grains)	=	31·1035 grammes
1 Avoirdupois Ounce (437·5 grains) (oz.)	=	28·3495 grammes
1 Pound (7000 grains) (lb.)	=	453·5924 grammes 0·4536 kilogram

Measures of Capacity

1 Minim (0·9114583 grain of water at 16·7°) (m.)	=	0·0592 millilitre
1 Fluid Drachm (60 minims or 54·6875 grains of water at 16·7°) (fl. dr.)	=	3·5515 millilitres
1 Fluid Ounce (8 fluid drachms or 437·5 grains of water at 16·7°) (fl. oz.)	=	28·4123 millilitres 0·0284 litre
1 Pint (20 fluid ounces or 8750 grains of water at 16·7°) (pt.)	=	568·2454 millilitres 0·5682 litre
1 Quart (40 fluid ounces or 17,500 grains of water at 16·7°)	=	1136·4908 millilitres 1·1364 litres
1 Gallon (8 pints or 70,000 grains of water at 16·7°)	=	4545·9631 millilitres 4·5459631 litres 277·274 cubic inches

Weights and Measures of the British Pharmaceutical Codex—*Continued.*

METRIC WEIGHTS AND MEASURES

Measures of Length

1 Micromillimetre (0·000001 millimetre) ($\mu\mu$)	=	0·00000004 inch
1 Micron (0·001 millimetre) (μ)	=	0·0000394 inch
1 Millimetre (mm.)	=	0·0393701 inch
1 Centimetre (cm.)	=	0·3937011 inch
1 Decimetre (dm.)	=	3·9370113 inches
1 Metre	=	39·370113 inches 3·280843 feet 1·0936143 yards

Weights or Measures of Mass

1 Microgram (0·001 milligram) (γ)	=	0·000015 grain
1 Milligram (mg.)	=	0·015 grain
1 Centigram (cg.)	=	0·154 grain
1 Decigram (dg.)	=	1·543 grains
1 Gramme (g.)	=	15·4323564 grains 0·7716 scruple 0·2572 drachm 0·03215 ounce (troy) 0·03527 ounce (avoir.)
1 Kilogram (kg. or kilog.)	=	2·2046 pounds

Measures of Capacity

1 Microl (0·001 millilitre) (λ)	=	0·0169 minim
1 Centimil	=	0·1689 minim
1 Decimil	=	1·6894 minims
1 Millilitre or mil (1·000028 c.cm.) (ml.)	=	0·0352 fluid ounce
1 Centilitre	=	0·0176 pint
1 Decilitre	=	0·1759 pint
1 Litre (1000·028 c.cm.)	=	35·196 fluid ounces 1·7598 pints 0·219 gallon

APPENDIX II

Tables for Converting Quantities in the Metric System into Equivalent Quantities in the Imperial System*

(1)	(2)		(3)		(4)		(5)	
Grammes per litre or grammes per kilogram	Grammes per litre to grains per fluid ounce		Grammes per litre to grains per pint		Grammes per kilogram to grains per ounce (avoir.)		Grammes per kilogram to grains per pound (avoir.)	
	drachms (apoth.)	grains	ounces (avoir.)	grains	drachms (apoth.)	grains	ounces (avoir.)	grains
1	..	0·44	..	8·75	..	0·44	..	7
2	..	0·88	..	17·50	..	0·88	..	14
3	..	1·31	..	26·25	..	1·31	..	21
4	..	1·75	..	35·00	..	1·75	..	28
5	..	2·19	..	43·75	..	2·19	..	35
6	..	2·63	..	52·50	..	2·63	..	42
7	..	3·06	..	61·25	..	3·06	..	49
8	..	3·50	..	70·00	..	3·50	..	56
9	..	3·94	..	78·75	..	3·94	..	63
10	..	4·38	..	87·50	..	4·38	..	70
20	..	8·75	..	175·00	..	8·75	..	140
30	..	13·13	..	262·50	..	13·13	..	210
40	..	17·50	..	350·00	..	17·50	..	280
50	..	21·88	1	—	..	21·88	..	350
60	..	26·25	1	87·50	..	26·25	..	420
70	..	30·63	1	175·00	..	30·63	1	52·5
80	..	35·00	1	262·50	..	35·00	1	122·5
90	..	39·38	1	350·00	..	39·38	1	192·5
100	..	43·75	2	—	..	43·75	1	262·5
200	1	27·50	4	—	1	27·50	3	87·5
300	2	11·25	6	—	2	11·25	4	350·0
400	2	55·00	8	—	2	55·00	6	175·0
500	3	38·75	10	—	3	38·75	8	—
600	4	22·50	12	—	4	22·50	9	262·5
700	5	6·25	14	—	5	6·25	11	8·75
800	5	50·00	16	—	5	50·00	12	350·0
900	6	33·75	18	—	6	33·75	14	175·0
1000	7	17·50	20	—	7	17·50	16	—

Example.—To make 1 pound of Ointment of Phenol.

B.P. Formula

Phenol	30 g.	(from column 5)	30 g.	= 210 gr.
White Beeswax ..	75 g.	(„ „)	70 g. = 1 oz. 52·5 gr. 5 g. = 35 gr.	= 1 oz. 87·5 gr.
Lard	50 g.	(„ „)	50 g.	= 350 gr.
Hard Paraffin ..	75 g.	(„ „)	75 g.	= 1 oz. 87·5 gr.
White Soft Paraffin	770 g.	(„ „)	700 g. = 11 oz. 87·5 gr. 70 g. = 1 oz. 52·5 gr.	= 12 oz. 140 gr.

*A one per cent. solution containing 1 gramme of a solid in 100 millilitres of a solution is taken as equivalent for all practical purposes to a solution containing 1 ounce of a solid in 100 fluid ounces of solution.

Tables for Converting Quantities in the Metric System into Equivalent Quantities in the Imperial System—*Continued.*

(6)	(7)		(8)		(9)		(10)	
Millilitres per litre or millilitres per kilogram	Millilitres per litre to minims per fluid ounce		Millilitres per litre to minims per pint		Millilitres per kilogram to minims per ounce (avoir.)		Millilitres per kilogram to minims per pound (avoir.)	
	fluid drachms	minims	fluid ounces	minims	fluid drachms	minims	fluid ounces	minims
1	..	0·48	..	9·6	..	0·48	..	7·68
2	..	0·96	..	19·2	..	0·96	..	15·36
3	..	1·44	..	28·8	..	1·44	..	23·04
4	..	1·92	..	38·4	..	1·92	..	30·72
5	..	2·40	..	48·0	..	2·40	..	38·40
6	..	2·88	..	57·6	..	2·88	..	46·08
7	..	3·36	..	67·2	..	3·36	..	53·76
8	..	3·84	..	76·8	..	3·84	..	61·44
9	..	4·32	..	86·4	..	4·32	..	69·12
10	..	4·80	..	96·0	..	4·80	..	76·80
20	..	9·60	..	192·0	..	9·60	..	153·6
30	..	14·4	..	288·0	..	14·4	..	230·4
40	..	19·2	..	384·0	..	19·2	..	307·2
50	..	24·0	1	—	..	24·0	..	384·0
60	..	28·8	1	96·0	..	28·8	..	460·8
70	..	33·6	1	192·0	..	33·6	1	57·6
80	..	38·4	1	288·0	..	38·4	1	134·4
90	..	43·2	1	384·0	..	43·2	1	211·2
100	..	48·0	2	—	..	48·0	1	288·0
200	1	36·0	4	—	1	36·0	3	96·0
300	2	24·0	6	—	2	24·0	4	384·0
400	3	12·0	8	—	3	12·0	6	192·0
500	4	—	10	—	4	—	8	—
600	4	48·0	12	—	4	48·0	9	288·0
700	5	36·0	14	—	5	36·0	11	96·0
800	6	24·0	16	—	6	24·0	12	384·0
900	7	12·0	18	—	7	12·0	14	192·0
1000	8	—	20	—	8	—	16	—

Example.—To make 1 pint of Syrup of Ferrous Phosphate with Quinine and Strychnine.

B.P. Formula

Iron	8·6 g.	(from column 3)	8 g. = 70 gr. 0·6 g. = 5·25 gr. = 75·25 gr.
Phosphoric Acid ..	40 ml.	(,, ,, 8)	40 ml. = 384 m.
Strychnine Hydrochloride ..	0·3 g.	(,, ,, 3)	0·3 g. = 2·6 gr.
Quinine Sulphate	14·8 g.	(,, ,, 3)	10 g. = 87·5 gr. 4 g. = 35·0 gr. 0·8 g. = 7 gr. = 129·5 gr.
Syrup	560 ml.	(,, ,, 8)	500 ml. = 10 fl. oz. 60 ml. = 1 fl. oz. 96 m. = 11 fl. oz. 96 m.
Glycerin	140 ml.	(,, ,, 8)	100 ml. = 2 fl. oz. 40 ml. = 384 m. = 2 fl. oz. 384 m.
Distilled Water to	1000 ml.		to 20 fl. oz.

APPENDIX III

Tables for the Dilution of Alcohol

The volumes of alcohol (95 per cent.) which must be diluted with distilled water in order to produce one litre of the various official dilute alcohols are given under Alcohol. When alcohol and water are mixed, contraction in volume and rise of temperature occur and it is important that before the final adjustment to volume is made the diluted alcohol should be allowed to cool to the same temperature, about 15°, as that at which the alcohol (95 per cent.) was measured. Owing to the large coefficients of expansion of alcohol and its dilutions, if this precaution as to cooling is neglected, errors will result and the actual alcoholic strength may differ considerably from that required.

When it is necessary to dilute alcohol of a strength other than 95 per cent., or in order to avoid the necessity for cooling, the alcohol strength of the diluted liquid may be ascertained from the specific gravity. When this method is adopted, the concentrated alcohol is diluted approximately to the required strength, the apparent strength is ascertained from the specific gravity determined by means of a hydrometer, a correction is applied for temperature when this exceeds 15·6°, and the liquid is adjusted as found necessary by the addition of stronger alcohol or of water. The necessary tables are given below. Table A gives specific gravities at 15·6° in the first column and the corresponding percentages of alcohol by volume in the second column. Table B gives the correction to be applied when the temperature of the diluted liquid is between 16° and 35°; the correction is subtracted from the apparent percentage read off from Table A.

The following example illustrates the use of the tables when applied to the preparation of approximately 1 litre of alcohol (45 per cent.):—

In accordance with the figures given under Alcohol, 474 millilitres of alcohol (95 per cent.) was diluted with water to 1 litre. The dilution had a specific gravity of 0·930, and a temperature of 29°. By reference to Table A, the apparent percentage by volume of alcohol corresponding to this gravity is 52·18. By reference to Table B, the error in an observed percentage of 52 at 29° is seen to be 5·04. The corrected strength is therefore 52·18 minus 5·04, or 47·1 per cent. Since the change in temperature and the contraction in volume are negligible in making the small final adjustment, alcohol (45 per cent.) may be made by diluting 450 millilitres of the above liquid to 471 millilitres with water; 1 litre must therefore be diluted with 46 millilitres of water. If desired, the result may be checked with the hydrometer. In the above example, after adding the 46 millilitres of water, the temperature was still 29°, and the specific gravity was 0·934. Hence, the apparent percentage by volume (from Table A) is 50·15; the correction (from Table B, by interpolation between the figures given for apparent percentages of 49 and 52) is 5·11; the corrected percentage by volume is therefore 45·04.

TABLE A

Specific Gravity and Percentage by Volume

Specific Gravity 15·6°/15·6°	Percentage of Ethyl Alcohol by volume	Specific Gravity 15 6°/15·6°	Percentage of Ethyl Alcohol by volume
1·000	0	0·949	41·74
0·999	0 66	8	42·35
8	1·34	7	42·95
7	2·02	6	43·54
6	2·71	5	44·13
5	3·42	4	44·71
4	4·14	3	45·28
3	4·88	2	45·85
2	5·63	1	46·40
1	6·40	0	46·95
0	7·18	939	47·50
989	7·98	8	48·04
8	8·80	7	48·57
7	9·65	6	49·10
6	10·51	5	49·63
5	11·40	4	50·15
4	12·2)	3	50·67
3	13·20	2	51·18
2	14·13	1	51·68
1	15·08	0	52·18
0	16 04	929	52·67
979	17·02	8	53·16
8	18·00	7	53·65
7	18·99	6	54·14
6	19·98	5	54·62
5	20·97	4	55·10
4	21·96	3	55·58
3	22·94	2	56·05
2	23·91	1	56·52
1	24·85	0	56·99
0	25·83	919	57·46
969	26·77	8	57·92
8	27·69	7	58·38
7	28·69	6	58·83
6	29·48	5	59·29
5	30·34	4	59·74
4	31·18	3	60·19
3	31·99	2	60·63
2	32·79	1	61·07
1	33·56	0	61·51
0	34·33	909	61·95
959	35·06	8	62·39
8	35·79	7	62·83
7	36·50	6	63·26
6	37·20	5	63·70
5	37·89	4	64·13
4	38·57	3	64·56
3	39·22	2	64·98
2	39·87	1	65·41
1	40·50	0	65·83
0	41·13	899	66·25

Specific Gravity and Percentage by Volume—*Continued.*

Specific Gravity 15·6°/15·6°	Percentage of Ethyl Alcohol by volume	Specific Gravity 15·6°/15·6°	Percentage of Ethyl Alcohol by volume
0·898	66·67	0·845	86·44
7	67·08	4	86·77
6	67·50	3	87·09
5	67·92	2	87·42
4	68·33	1	87·74
3	68·74	0	88·06
2	69·14	839	88·37
1	69·55	8	88·68
0	69·95	7	88·99
889	70·35	6	89·30
8	70·75	5	89·61
7	71·15	4	89·91
6	71·55	3	90·22
5	71·95	2	90·52
4	72·34	1	90·82
3	72·74	0	91·11
2	73·13	829	91·40
1	73·52	8	91·69
0	73·91	7	91·98
879	74·30	6	92·26
8	74·68	5	92·55
7	75·06	4	92·83
6	75·44	3	93·11
5	75·82	2	93·38
4	76·19	1	93·65
3	76·57	0	93·92
2	76·94	819	94·19
1	77·32	8	94·45
0	77·69	7	94·71
869	78·06	6	94·97
8	78·43	5	95·22
7	78·80	4	95·47
6	79·16	3	95·72
5	79·53	2	95·97
4	79·89	1	96·21
3	80·25	0	96·45
2	80·61	809	96·69
1	80·97	8	96·93
0	81·32	7	97·16
859	81·68	6	97·39
8	82·03	5	97·62
7	82·38	4	97·84
6	82·73	3	98·06
5	83·08	2	98·28
4	83·42	1	98·49
3	83·77	0	98·70
2	84·11	799	98·91
1	84·44	8	99·12
0	84·78	7	99·32
849	85·12	6	99·52
8	85·46	5	99·72
7	85·80	4	99·92
6	86·12	0·793590	100·00

TABLE B

Temperature Corrections

(To be subtracted from the observed percentage)

Temperature	Apparent Percentage of Alcohol by Volume as found from Table A											
	1	2	3	4	5	6	7	8	9	10	12	14
16°	0·04	0·04	0·05	0·05	0·05	0·05	0·05	0·06	0·06	0·06	0·07	0·08
17°	0·14	0·14	0·16	0·16	0·16	0·17	0·17	0·19	0·20	0·21	0·24	0·29
18°	0·25	0·25	0·27	0·27	0·27	0·29	0·31	0·33	0·35	0·37	0·42	0·49
19°	0·36	0·36	0·38	0·39	0·40	0·43	0·45	0·48	0·51	0·54	0·61	0·69
20°	0·48	0·48	0·50	0·52	0·54	0·57	0·60	0·64	0·67	0·71	0·80	0·91
21°	0·60	0·61	0·63	0·65	0·68	0·71	0·75	0·80	0·84	0·89	0·99	1·12
22°	0·73	0·75	0·77	0·79	0·83	0·86	0·91	0·97	1·02	1·07	1·19	1·35
23°	0·86	0·89	0·91	0·94	0·98	1·02	1·08	1·14	1·20	1·26	1·40	1·58
24°	1·00	1·04	1·06	1·10	1·14	1·20	1·25	1·32	1·38	1·45	1·61	1·81
25°		1·19	1·22	1·26	1·30	1·36	1·41	1·49	1·57	1·65	1·82	2·04
26°		1·35	1·38	1·43	1·47	1·54	1·60	1·68	1·76	1·85	2·04	2·28
27°		1·52	1·55	1·61	1·65	1·73	1·79	1·88	1·96	2·06	2·27	2·52
28°		1·69	1·73	1·78	1·84	1·91	1·99	2·08	2·17	2·28	2·50	2·76
29°		1·87	1·91	1·96	2·03	2·10	2·19	2·28	2·38	2·50	2·73	3·00
30°			2·09	2·15	2·22	2·30	2·39	2·49	2·60	2·72	2·97	3·25
31°			2·27	2·34	2·41	2·50	2·60	2·70	2·82	2·95	3·21	3·51
32°			2·45	2·54	2·61	2·71	2·82	2·92	3·05	3·18	3·46	3·77
33°			2·63	2·74	2·81	2·92	3·04	3·15	3·26	3·42	3·71	4·03
34°			2·82	2·95	3·02	3·14	3·27	3·39	3·52	3·66	3·96	4·29
35°				3·16	3·24	3·36	3·49	3·63	3·76	3·91	4·22	4·55

Temperature	Apparent Percentage of Alcohol by Volume as found from Table A											
	16	18	20	22	24	26	28	30	32	34	37	40
16°	0·10	0·12	0·13	0·14	0·15	0·16	0·17	0·18	0·19	0·19	0·19	0·18
17°	0·33	0·38	0·42	0·46	0·50	0·54	0·57	0·59	0·60	0·60	0·59	0·58
18°	0·56	0·65	0·73	0·79	0·84	0·89	0·95	0·99	1·00	1·01	1·00	0·98
19°	0·80	0·91	1·02	1·11	1·19	1·27	1·33	1·39	1·40	1·41	1·41	1·39
20°	1·04	1·18	1·32	1·44	1·54	1·64	1·72	1·79	1·81	1·82	1·81	1·79
21°	1·28	1·45	1·61	1·76	1·88	2·00	2·10	2·18	2·21	2·22	2·22	2·19
22°	1·53	1·73	1·91	2·07	2·21	2·35	2·47	2·57	2·60	2·63	2·63	2·59
23°	1·78	2·00	2·21	2·39	2·55	2·71	2·84	2·95	3·00	3·03	3·03	3·00
24°	2·04	2·28	2·51	2·71	2·88	3·06	3·21	3·34	3·40	3·44	3·44	3·40
25°	2·29	2·56	2·81	3·03	3·22	3·41	3·58	3·73	3·80	3·84	3·85	3·80
26°	2·55	2·83	3·11	3·35	3·56	3·77	3·95	4·11	4·20	4·25	4·26	4·21
27°	2·80	3·11	3·41	3·68	3·91	4·13	4·32	4·50	4·59	4·65	4·67	4·62
28°	3·06	3·38	3·71	4·00	4·25	4·49	4·70	4·88	4·99	5·05	5·07	5·02
29°	3·32	3·66	4·01	4·33	4·60	4·85	5·06	5·26	5·38	5·46	5·58	5·43
30°	3·58	3·94	4·31	4·65	4·94	5·21	5·43	5·64	5·77	5·86	5·89	5·84
31°	3·85	4·22	4·61	4·97	5·28	5·56	5·80	6·01	6·16	6·26	6·29	6·24
32°	4·12	4·51	4·92	5·30	5·62	5·91	6·16	6·39	6·54	6·65	6·70	6·65
33°	4·40	4·80	5·22	5·62	5·95	6·26	6·50	6·76	6·92	7·04	7·10	7·05
34°	4·67	5·09	5·54	5·94	6·29	6·62	6·90	7·13	7·30	7·44	7·51	7·46
35°	4·94	5·39	5·86	6·27	6·63	6·97	7·26	7·50	7·67	7·83	7·91	7·86

Temperature Corrections—*Continued.*

(To be subtracted from the observed percentage)

Temperature	Apparent Percentage of Alcohol by Volume as found from Table A											
	43	46	49	52	55	58	61	64	67	70	72	76
16°	0·18	0·18	0·17	0·17	0·16	0·16	0·16	0·16	0·16	0·15	0·15	0·14
17°	0·57	0·56	0·55	0·53	0·52	0·51	0·50	0·49	0·48	0·47	0·46	0·45
18°	0·97	0·95	0·93	0·90	0·88	0·86	0·85	0·83	0·82	0·80	0·79	0·76
19°	1·37	1·34	1·30	1·27	1·25	1·22	1·19	1·17	1·14	1·12	1·11	1·08
20°	1·76	1·72	1·68	1·64	1·61	1·57	1·54	1·51	1·48	1·45	1·42	1·39
21°	2·15	2·11	2·06	2·02	1·98	1·94	1·90	1·85	1·82	1·79	1·75	1·70
22°	2·55	2·50	2·44	2·39	2·34	2·29	2·24	2·20	2·16	2·12	2·07	2·02
23°	2·94	2·89	2·82	2 76	2·71	2·66	2·60	2·55	2·50	2·46	2·39	2·33
24°	3·34	3·28	3·21	3·14	3·07	3·01	2·95	2·90	2·84	2·79	2·72	2·65
25°	3·74	3·67	3·60	3·52	3·44	3·37	3·31	3·24	3·18	3·13	3·05	2·97
26°	4·14	4·07	3·98	3 89	3 81	3·74	3·67	3·59	3·53	3·47	3·38	3·29
27°	4·55	4·47	4·37	4·27	4·18	4·10	4·02	3·95	3·87	3·80	3·71	3·62
28°	4·95	4·86	4·76	4 65	4·56	4·48	4·39	4·31	4·22	4·14	4·04	3·95
29°	5·35	5·26	5·15	5·04	4·93	4·84	4·75	4·66	4·57	4·48	4·38	4·27
30°	5·75	5·66	5·53	5·41	5·30	5·20	5·11	5·01	4·91	4·82	4·71	4·59
31°	6·15	6·06	5·92	5·79	5·67	5·57	5·48	5·37	5·27	5·17	5·05	4·93
32°	6·56	6·46	6·32	6·19	6·05	5·95	5·84	5·73	5·62	5·51	5·39	5·26
33°	6·96	6·85	6·72	6·57	6·43	6·32	6·20	6·09	5·97	5·86	5·73	5·59
34°	7·36	7·25	7·12	6·96	6·81	6·69	6·56	6·44	6·32	6·21	6·07	5·92
35°	7·76	7·65	7·51	7·35	7·19	7·06	6·93	6·80	6·68	6·56	6·41	6·25

Temperature	Apparent Percentage of Alcohol by Volume as found from Table A										
	79	82	84	86	88	90	92	94	96	98	100
16°	0·13	0·13	0·13	0·13	0·12	0·12	0·11	0·10	0·10	0·09	0·08
17°	0·44	0·42	0·41	0·41	0·39	0·38	0·36	0·33	0·31	0·27	0·24
18°	0·74	0·71	0·70	0·69	0·66	0·63	0·60	0·56	0·52	0·46	0·40
19°	1·04	1·00	0·98	0·96	0·93	0·89	0·85	0·79	0·73	0·65	0·57
20°	1·34	1·30	1·28	1·24	1·20	1·15	1·09	1·02	0·94	0·85	0·74
21°	1·66	1·60	1·57	1·53	1·47	1·42	1·34	1·26	1·16	1·05	0·92
22°	1·97	1·90	1·86	1·82	1·75	1·69	1·60	1·50	1·39	1·26	1·09
23°	2·27	2·20	2·15	2·10	2·03	1·96	1·86	1·75	1·61	1·46	1·27
24°	2·58	2·50	2·45	2·39	2·31	2·23	2·12	1·99	1·84	1·67	1·45
25°	2·89	2·81	2·75	2·68	2·60	2·50	2·38	2·23	2·07	1·88	1·63
26°	3·21	3·11	3·05	2·96	2·89	2·78	2·64	2·48	2·31	2·10	1·82
27°	3·52	3·42	3·35	3·27	3·17	3·05	2·91	2·74	2·54	2·31	2·00
28°	3·84	3·73	3·65	3·57	3·46	3·33	3·18	2·99	2·78	2·53	2·19
29°	4·16	4·04	3·96	3·86	3;74	3·61	3·45	3·25	3·02	2·75	2·38
30°	4·47	4·34	4·26	4·16	4·03	3·89	3·72	3·51	3·26	2·98	2·58
31°	4·79	4·66	4·56	4·46	4·32	4·18	3·99	3·77	3·51	3·21	2·78
32°	5·12	4·98	4·88	4·77	4·62	4·46	4·27	4·03	3·76	3·45	2·99
33°	5·45	5·30	5·19	5·07	4·92	4·75	4·54	4·30	4·01	3·68	3·19
34°	5·77	5·62	5·51	5·38	5·22	5·03	4·82	4·56	4·26	3·92	3·40
35°	6·09	5·94	5·82	5·69	5·52	5·32	5·09	4·82	4·52	4·15	3·61

APPENDIX IV

ATOMIC WEIGHTS

(1934—International Union of Chemistry)

Element	Symbol	Atomic Weight
Aluminium	Al	26·97
Antimony	Sb	121·76
Argon	A	39·944
Arsenic	As	74·91
Barium	Ba	137·36
Beryllium	Be	9·02
Bismuth	Bi	209·00
Boron	B	10·82
Bromine	Br	79·916
Cadmium	Cd	112·41
Cæsium	Cs	132·9
Calcium	Ca	40·08
Carbon	C	12·00
Cerium	Ce	140·13
Chlorine	Cl	35·457
Chromium	Cr	52·01
Cobalt	Co	58·94
Copper	Cu	63·57
Dysprosium	Dy	162·46
Erbium	Er	167·64
Europeum	Eu	152·0
Fluorine	F	19·00
Gadolinium	Gd	157·3
Gallium	Ga	69·72
Germanium	Ge	72·60
Gold	Au	197·2
Hafnium	Hf	178·6
Helium	He	4·002
Holmium	Ho	163·5
Hydrogen	H	1·0078
Indium	In	114·76
Iodine	I	126·92
Iridium	Ir	193·1
Iron	Fe	55·84
Krypton	Kr	83·7
Lanthanum	La	138·92
Lead	Pb	207·22
Lithium	Li	6·940
Lutecium	Lu	175·0
Magnesium	Mg	24·32
Manganese	Mn	54·93
Mercury	Hg	200·61
Molybdenum	Mo	96·0
Neodymium	Nd	144·27
Neon	Ne	20·183
Nickel	Ni	58·69
Niobium (Columbium)	Nb (Cb)	93·3
Nitrogen	N	14 008
Osmium	Os	191·5
Oxygen	O	16 0000
Palladium	Pd	106·7
Phosphorus	P	31·02
Platinum	Pt	195·23
Potassium	K	39·096
Praseodymium	Pr	140 92
Radium	Ra	225 97
Radon	Rn	222·00
Rhenium	Re	186·31
Rhodium	Rh	102·91
Rubidium	Rb	85·44
Ruthenium	Ru	101·7
Samarium	Sm	150·43
Scandium	Sc	45·10
Selenium	Se	78·96
Silicon	Si	28·06
Silver	Ag	107·880
Sodium	Na	22·997
Strontium	Sr	87·63
Sulphur	S	32·06
Tantalum	Ta	181·4
Tellurium	Te	127·61
Terbium	Tb	159·2
Thallium	Tl	204·39
Thorium	Th	232·12
Thulium	Tm	169·4
Tin	Sn	118·70
Titanium	Ti	47·90
Tungsten	W	184·0
Uranium	U	238·14
Vanadium	V	50·95
Xenon	X	131·3
Ytterbium	Yb	173·04
Yttrium	Y	88·92
Zinc	Zn	65·38
Zirconium	Zr	91·22

APPENDIX V

Molecular Weights

The following list contains molecular weights that are used frequently in analytical operations. A complete list of atomic weights is included separately, and the molecular weights are based upon these atomic weights, for which, O = 16, is taken as the standard. The list contains substances of the British Pharmacopœia and of the British Pharmaceutical Codex, and also some that are not official. In the case of a few compounds for which a definite formula cannot be established, a theoretical formula is given for information, and in the case of some compounds having water of crystallisation, the formula and molecular weight of the anhydrous compound are given also.

Acetaldehyde	C_2H_4O	44·03
Acetanilide	C_8H_9ON	135·07
Acetarsol	$C_8H_{10}O_5NAs$	275·00
Acetic Anhydride	$C_4H_6O_3$	102·05
Acetone	C_3H_6O	58·05
Acetophenone	C_8H_8O	120·06
Acid Acetic	$C_2H_4O_2$	60·03
Acid Acetylsalicylic	$C_9H_8O_4$	180·06
Acid Arsenic	$H_3AsO_4,\frac{1}{2}H_2O$	150·94
Acid Aurobromic	$HAuBr_4,5H_2O$	607·95
Acid Aurochloric	$HAuCl_4,4H_2O$	412·10
Acid Benzoic	$C_7H_6O_2$	122·05
Acid Boric	H_3BO_3	61·84
Acid Cacodylic	$C_2H_7O_2As$	137·96
Acid Camphoric	$C_{10}H_{16}O_4$	200·12
Acid Chloroplatinic	$H_2PtCl_6,6H_2O$	518·08
Acid Cinnamic	$C_9H_8O_2$	148·06
Acid Citric	$C_6H_8O_7,H_2O$	210·08
Acid Formic	CH_2O_2	46·02
Acid Gallic	$C_7H_6O_5,H_2O$	188·06
Acid Glycerophosphoric	$C_3H_9O_6P$	172·09
Acid Hippuric	$C_9H_9O_3N$	179·08
Acid Hydriodic	HI	127·93
Acid Hydrobromic	HBr	80·92
Acid Hydrochloric	HCl	36·46
Acid Hydrocyanic	HCN	27·02
Acid Hydrofluoric	HF	20·01
Acid Hypophosphorous	H_3PO_2	66·04
Acid Lactic	$C_3H_6O_3$	90·05
Acid Malic	$C_4H_6O_5$	134·05
Acid Metaboric	HBO_2	43·83
Acid Nitric	HNO_3	63·02
Acid Nitrous	HNO_2	47·02

Molecular Weights—*Continued.*

Acid Oleic	$C_{18}H_{34}O_2$	282·27
Acid Oxalic	$C_2H_2O_4,2H_2O$	126·05
Acid Oxalic (anhydrous)	$C_2H_2O_4$	90·02
Acid Phosphoric	H_3PO_4	98·04
Acid Phosphorous	H_3PO_3	82·04
Acid Pyroboric	$H_2B_4O_7$	157·30
Acid Salicylic	$C_7H_6O_3$	138·05
Acid Stearic	$C_{18}H_{36}O_2$	284·28
Acid Succinic	$C_4H_6O_4$	118·05
Acid Sulphanilic	$C_6H_7O_3NS,2H_2O$	209·15
Acid Sulphuric	H_2SO_4	98·08
Acid Sulphurous	H_2SO_3	82·08
Acid Tartaric	$C_4H_6O_6$	150·05
Acid Trichloracetic	$C_2HO_2Cl_3$	163·38
Acid Uric	$C_5H_4O_3N_3$	154·06
Acid Valeric	$C_5H_{10}O_2$	102·08
Aconitine	$C_{34}H_{47}O_{11}N$	645·37
Aconitine Hydrobromide	$C_{34}H_{47}O_{11}N,HBr,2\frac{1}{2}H_2O$	771·34
Aconitine Hydrochloride	$C_{34}H_{47}O_{11}N,HCl,3H_2O$	735·89
Aconitine Nitrate	$C_{34}H_{47}O_{11}N,HNO_3$	708·39
Acriflavine	$C_{14}H_{14}N_3Cl,HCl$	296·06
Adrenaline	$C_9H_{13}O_3N$	183·11
Alcohol, Amyl	$C_5H_{12}O$	88·09
Alcohol, Ethyl	C_2H_6O	46·05
Alcohol, Isopropyl	C_3H_8O	60·06
Alcohol, Methyl	CH_4O	32·03
Allantoin	$C_4H_6O_3N_4$	158·08
Allyl Isothiocyanate	C_4H_5NS	99·11
Allyl Sulphide	$C_6H_{10}S$	114·14
Aluminium Acetate	$(C_2H_3O_2)_6Al_2$	408·08
Aluminium Ammonium Sulphate	$NH_4Al(SO_4)_2,12H_2O$	453·32
Aluminium Ammonium Sulphate (anhydrous)	$NH_4Al(SO_4)_2$	237·13
Aluminium Potassium Sulphate	$KAl(SO_4)_2,12H_2O$	474·38
Aluminium Potassium Sulphate (anhydrous)	$KAl(SO_4)_2$	258·19
Aluminium Chloride	$AlCl_3,6H_2O$	241·43
Aluminium Hydroxide	$Al(OH)_3$	78·00
Aluminium Oxide	Al_2O_3	101·94
Aluminium Sulphate	$Al_2(SO_4)_3,16H_2O$	630·37
Aluminium Sulphate (anhydrous)	$Al_2(SO_4)_3$	342·12
Amidopyrine	$C_{13}H_{17}ON_3$	231·16
Ammonia	NH_3	17·03

Molecular Weights—*Continued.*

Ammonium Acetate	$C_2H_3O_2(NH_4)$	77·06
Ammonium Benzoate	$C_7H_5O_2(NH_4)$	139·08
Ammonium Bicarbonate	NH_4HCO_3	79·05
Ammonium Bromide	NH_4Br	97·96
Ammonium Carbamate	$N_2H_6CO_2$	78·06
Ammonium Carbonate (normal)	$(NH_4)_2CO_3$	96·08
Ammonium Chloride	NH_4Cl	53·50
Ammonium Chlorplatinate	$(NH_4)_2PtCl_6$	444·05
Ammonium Citrate	$C_6H_5O_7(NH_4)_3,H_2O$	261·18
Ammonium Hippurate	$C_9H_8O_3N(NH_4)$	196·11
Ammonium Iodide	NH_4I	144·96
Ammonium Nitrate	NH_4NO_3	80·05
Ammonium Oxalate	$C_2O_4(NH_4)_2,H_2O$	142·09
Ammonium Persulphate	$(NH_4)_2S_2O_8$	228·20
Ammonium Phosphate	$(NH_4)_2HPO_4$	132·11
Ammonium Salicylate	$C_7H_5O_3(NH_4)$	155·08
Ammonium Sulphate	$(NH_4)_2SO_4$	132·14
Ammonium Sulphide	$(NH_4)_2S$	68·14
Ammonium Tartrate	$C_4H_4O_6(NH_4)_2$	184·11
Ammonium Vanadate	NH_4VO_3	116·99
Amydricaine Hydrochloride	$C_{16}H_{26}O_2N_2,HCl$	314·68
Amyl Acetate	$C_7H_{14}O_2$	130·11
Amyl Nitrite	$C_5H_{11}O_2N$	117·09
Amylene Hydrate	$C_5H_{12}O$	88·09
Amylocaine Hydrochloride	$C_{14}H_{21}O_2N,HCl$	271·63
Anethole	$C_{10}H_{12}O$	148·09
Aniline	C_6H_7N	93·06
Antimonious Chloride	$SbCl_3$	228·13
Antimonious Oxide	Sb_2O_3	291·52
Antimonious Sulphide	Sb_2S_3	339·70
Apomorphine Hydrochloride	$C_{17}H_{17}O_2N,HCl,\frac{1}{2}H_2O$	312·61
Arsenic Sulphide	As_2S_5	310·12
Arsenic Triiodide	AsI_3	455·67
Arsenic Trioxide	As_2O_3	197·82
Arsenous Sulphide	As_2S_3	246·00
Atropine	$C_{17}H_{23}O_3N$	289·19
Atropine Salicylate	$C_{17}H_{23}O_3N,C_7H_6O_3$	427·23
Atropine Sulphate	$(C_{17}H_{23}O_3N)_2,H_2SO_4,H_2O$	694·47
Barbitone	$C_8H_{12}O_3N_2$	184·11
Barbitone, Soluble	$C_8H_{11}O_3N_2Na$	206·10
Barium Carbonate	$BaCO_3$	197·36
Barium Chloride	$BaCl_2,2H_2O$	244·31
Barium Chloride (anhydrous)	$BaCl_2$	208·27
Barium Hydroxide	$Ba(OH)_2,8H_2O$	315·50
Barium Sulphate	$BaSO_4$	233·42

Molecular Weights—*Continued.*

Benzaldehyde	C_7H_6O	106·05
Benzamine Hydrochloride	$C_{15}H_{21}O_2N,HCl$	283·64
Benzamine Lactate	$C_{15}H_{21}O_2N,C_3H_6O_3$	337·22
Benzene	C_6H_6	78·05
Benzidine	$C_{12}H_{12}N_2$	184·11
Benzocaine	$C_9H_{11}O_2N$	165·09
Benzophenone	$C_{13}H_{10}O$	182·08
Benzyl Benzoate	$C_{14}H_{12}O_2$	212·09
Benzyl Succinate	$C_{18}H_{18}O_4$	298·14
Benzylmorphine	$C_{24}H_{25}O_3N$	375·20
Berberine	$C_{20}H_{19}O_5N$	353·16
Berberine Carbonate	$C_{20}H_{19}O_4N(HCO_3),2H_2O$	433·19
Berberine Hydrochloride	$C_{20}H_{18}O_4NCl,2H_2O$	407·64
Berberine Phosphate	$C_{20}H_{18}O_4N(H_2PO_4),H_3PO_4,1\frac{1}{2}H_2O$	558·25
Berberine Sulphate	$C_{20}H_{18}O_4N(HSO_4)$	433·22
Betanaphthol	$C_{10}H_8O$	144·06
Betanaphthyl Benzoate	$C_{17}H_{12}O_2$	248·09
Betanaphthyl Salicylate	$C_{17}H_{12}O_3$	264·09
Bismuth Carbonate	$(Bi_2O_2CO_3)_2,H_2O$	1038·02
Bismuth Citrate	$C_6H_5O_7Bi$	398·04
Bismuth Hydroxide	$Bi(OH)_3$	260·02
Bismuth Naphtholate	$C_{10}H_8O_4Bi_2$	610·06
Bismuth Nitrate	$Bi(NO_3)_3,5H_2O$	485·10
Bismuth Phosphate	$BiPO_4$	304·02
Bismuth Salicylate	$C_7H_5O_3,BiO$	362·04
Bismuth Subchloride	$BiOCl$	260·46
Bismuth Subnitrate	$6Bi_2O_3,5N_2O_5,9H_2O$	3498·22
Bismuth Sulphide	Bi_2S_3	514·18
Bismuth Tartrate	$(C_4H_4O_6)_3Bi_2$	862·09
Bismuth Trioxide	Bi_2O_3	466·00
Borax	$Na_2B_4O_7,10H_2O$	381·43
Bordeaux B	$C_{20}H_{12}N_2O_7S_2Na_2$	502·22
Borneol	$C_{10}H_{18}O$	154·14
Bornyl Acetate	$C_{12}H_{20}O_2$	196·16
Boron Trioxide	B_2O_3	69·64
Brilliant Green	$C_{27}H_{34}O_4N_2S$	482·34
Bromoform	$CHBr_3$	252·76
Brucine	$C_{23}H_{26}O_4N_2,4H_2O$	466·28
Brucine (anhydrous)	$C_{23}H_{26}O_4N_2$	394·22
Butylchloral Hydrate	$C_4H_7O_2Cl_3$	193·43
Cadmium Chloride	$CdCl_2,2H_2O$	219·36
Cadmium Iodide	CdI_2	366·27
Cadmium Sulphide	CdS	144·47
Caffeine	$C_8H_{10}O_2N_4,H_2O$	212·13
Caffeine (anhydrous)	$C_8H_{10}O_2N_4$	194·11

Molecular Weights—*Continued.*

Caffeine Citrate	$C_8H_{10}O_2N_4,C_6H_8O_7$	386·17
Caffeine Hydrobromide	$C_8H_{10}O_2N_4,HBr,2H_2O$	311·07
Caffeine Iodide	$C_8H_{10}O_2N_4I_2,HI,H_2O$	593·89
Caffeine Salicylate	$C_8H_{10}O_2N_4,C_7H_6O_3$	332·16
Calcium Acetylsalicylate	$C_{18}H_{14}O_8Ca,2H_2O$	434·22
Calcium Bromide	$CaBr_2,2H_2O$	235·94
Calcium Carbonate	$CaCO_3$	100·08
Calcium Chloride	$CaCl_2,6H_2O$	219·09
Calcium Chloride (anhydrous)	$CaCl_2$	110·99
Calcium Formate	$C_2H_2O_4Ca$	130·10
Calcium Glycerophosphate	$C_3H_7O_6PCa,2H_2O$	246·19
Calcium Hydroxide	$Ca(OH)_2$	74·10
Calcium Hypophosphite	$Ca(PH_2O_2)_2$	170·15
Calcium Iodide	CaI_2	293·92
Calcium Lactate	$C_6H_{10}O_6Ca,5H_2O$	308·24
Calcium Lactate (anhydrous)	$C_6H_{10}O_6Ca$	218·16
Calcium Oxalate	C_2O_4Ca	128·08
Calcium Oxide	CaO	56·08
Calcium Permanganate	$CaMn_2O_8,5H_2O$	368·02
Calcium Phosphate	$Ca_3(PO_4)_2$	310·28
Calcium Sodiumlactate	$C_{12}H_{20}O_{12}CaNa_2,4H_2O$	514·29
Calcium Sulphate	$CaSO_4,2H_2O$	172·17
Calcium Sulphate (anhydrous)	$CaSO_4$	136·14
Calcium Sulphide	CaS	72·14
Camphor	$C_{10}H_{16}O$	152·12
Camphor Monobromide	$C_{10}H_{15}OBr$	231·03
Cantharidin	$C_{10}H_{12}O_4$	196·09
Carbon Dioxide	CO_2	44·00
Carbon Disulphide	CS_2	76·12
Carbon Tetrachloride	CCl_4	153·83
Carbromal	$C_7H_{13}O_2N_2Br$	237·03
Carvone	$C_{10}H_{14}O$	150·11
Cerium Oxalate (anhydrous)	$(C_2O_4)_3Ce_2$	544·26
Chloral	C_2HOCl_3	147·38
Chloral Hydrate	C_2HOCl_3,H_2O	165·39
Chloral Formamide	$C_3H_4O_2NCl_3$	192·41
Chloramine	$C_7H_7O_2NClSNa,3H_2O$	281·62
Chlorbutol	$C_4H_7OCl_3$	177·43
Chloroform	$CHCl_3$	119·38
Chrome Alum	$KCr(SO_4)_2,12H_2O$	499·42
Chromium Oxide	Cr_2O_3	152·02
Chromium Trioxide	CrO_3	100·01
Cinchonidine	$C_{19}H_{22}ON_2$	294·19
Cinchonidine Dihydrochloride	$C_{19}H_{22}ON_2,2HCl$	367·11
Cinchonidine Hydrochloride	$C_{19}H_{22}ON_2,HCl$	330·65
Cinchonidine Salicylate	$C_{19}H_{22}ON_2,C_7H_6O_3$	432·23

Molecular Weights—*Continued.*

Cinchonidine Sulphate	$(C_{19}H_{22}ON_2)_2,H_2SO_4,7H_2O$	812·56
Cinchonine	$C_{19}H_{22}ON_2$	294·19
Cinchonine Dihydrochloride	$C_{19}H_{22}ON_2,2HCl$	367·11
Cinchonine Hydrochloride	$C_{19}H_{22}ON_2,HCl,2H_2O$	366·68
Cinchonine Sulphate	$(C_{19}H_{22}ON_2)_2,H_2SO_4,2H_2O$	722·48
Cinchophen	$C_{16}H_{11}O_2N$	249·09
Cinnamic Aldehyde	C_9H_8O	132·06
Citral	$C_{10}H_{16}O$	152·12
Cobalt Nitrate	$Co(NO_3)_2,6H_2O$	291·05
Cobalt Nitrate (anhydrous)	$Co(NO_3)_2$	182·96
Cocaine	$C_{17}H_{21}O_4N$	303·17
Cocaine Hydrochloride	$C_{17}H_{21}O_4N,HCl$	339·63
Cocaine Nitrate	$C_{17}H_{21}O_4N,HNO_3$	366·19
Codeine	$C_{18}H_{21}O_3N,H_2O$	317·19
Codeine (anhydrous)	$C_{18}H_{21}O_3N$	299·17
Codeine Hydrochloride	$C_{18}H_{21}O_3N,HCl,2H_2O$	371·67
Codeine Phosphate	$C_{18}H_{21}O_3N,H_3PO_4,H_2O$	415·23
Codeine Phosphate (anhydrous)	$C_{18}H_{21}O_3N,H_3PO_4$	397·21
Codeine Sulphate	$(C_{18}H_{21}O_3N)_2,H_2SO_4,5H_2O$	786·50
Codeine Sulphate (anhydrous)	$(C_{18}H_{21}O_3N)_2,H_2SO_4$	696 42
Colchicine	$C_{22}H_{25}O_6N$	399 20
Colchicine Salicylate	$C_{22}H_{25}O_6N,C_7H_6O_3$	537·25
Coniine	$C_8H_{17}N$	127 14
Coniine Hydrobromide	$C_8H_{17}N,HBr$	208·06
Coniine Hydrochloride	$C_8H_{17}N,HCl$	163·60
Copper Nitrate	$Cu(NO_3)_2,3H_2O$	241 63
Copper Sulphate	$CuSO_4,5H_2O$	249·71
Copper Sulphate (anhydrous)	$CuSO_4$	159·63
Copper Sulphide	CuS	95·63
Cotarnine	$C_{12}H_{15}O_4N$	237·13
Cotarnine Chloride	$C_{12}H_{14}O_3NCl,2H_2O$	291·61
Coumarin	$C_9H_6O_2$	146·05
Creosol	$C_8H_{10}O_2$	138·08
Cresol	C_7H_8O	108·06
Dextrose	$C_6H_{12}O_6$	180·09
Diamorphine	$C_{21}H_{23}O_5N$	369·19
Diamorphine Hydrochloride	$C_{21}H_{23}O_5N,HCl,H_2O$	423·67
Dichloramine	$C_7H_7O_2NCl_2S$	240·04
Dichlorbenzene	$C_6H_4Cl_2$	146·95
Dichlorethylene	$C_2H_2Cl_2$	96·93
Dipentene	$C_{10}H_{16}$	136·12
Emetine	$C_{29}H_{40}O_4N_2$	480·33
Emetine Hydrobromide	$C_{29}H_{40}O_4N_2,2HBr,4H_2O$	714·24
Emetine Hydrochloride	$C_{29}H_{40}O_4N_2,2HCl,7H_2O$	679·37
Ephedrine	$C_{10}H_{15}ON$	165·13

Molecular Weights—*Continued.*

Ephedrine Hydrochloride	$C_{10}H_{15}ON,HCl$	201·59
Ephedrine Sulphate	$(C_{10}H_{15}ON)_2,H_2SO_4$	428 33
Erythrityl Tetranitrate	$C_4H_6(NO_3)_4$	302 08
Ether	$C_4H_{10}O$	74 08
Ethyl Acetate	$C_4H_8O_2$	88 06
Ethyl Bromide	C_2H_5Br	108 96
Ethyl Chloride	C_2H_5Cl	64·50
Ethyl Iodide	C_2H_5I	155·96
Ethyl Nitrite	$C_2H_5O_2N$	75·05
Ethylene	C_2H_4	28·03
Ethylene Dibromide	$C_2H_4Br_2$	187·86
Ethylene Dichloride	$C_2H_4Cl_2$	98·95
Ethylhydrocupreine	$C_{21}H_{28}O_2N_2$	340·23
Ethylhydrocupreine Hydrochloride	$C_{21}H_{28}O_2N_2,HCl$	376·70
Ethylmorphine Hydrochloride	$C_{19}H_{23}O_3N,HCl,2H_2O$	385·68
Eucalyptol	$C_{10}H_{18}O$	154·14
Euflavine	$C_{14}H_{14}N_3Cl$	259·59
Ferric Ammonium Sulphate	$NH_4Fe(SO_4)_2,12H_2O$	482·19
Ferric Ammonium Sulphate (anhydrous)	$NH_4Fe(SO_4)_2$	266·00
Ferric Chloride	$FeCl_3,6H_2O$	270·30
Ferric Chloride (anhydrous)	$FeCl_3$	162·21
Ferric Formate	$C_7H_9O_{16}Fe_3,4H_2O$	588·65
Ferric Hydroxide	$Fe(OH)_3$	106·86
Ferric Hypophosphite	$Fe(PH_2O_2)_3$	250·95
Ferric Oxide	Fe_2O_3	159·68
Ferric Phosphate	$FePO_4$	150·86
Ferric Sulphate	$Fe_2(SO_4)_3$	399·86
Ferrous Carbonate	$FeCO_3$	115·84
Ferrous Iodide	FeI_2	309·68
Ferrous Oxide	FeO	71·84
Ferrous Phosphate	$Fe_3(PO_4)_2,8H_2O$	501·72
Ferrous Phosphate (anhydrous)	$Fe_3(PO_4)_2$	357·60
Ferrous Sulphate	$FeSO_4,7H_2O$	278·01
Ferrous Sulphate (anhydrous)	$FeSO_4$	151·90
Fluorescein, Soluble	$C_{20}H_{10}O_5Na_2$	376·07
Formaldehyde	CH_2O	30·02
Glycerin	$C_3H_8O_3$	92·06
Glyceryl Trinitrate	$C_3H_5(NO_3)_3$	227·06
Gold Bromide	$KAuBr_4,2H_2O$	591·99
Gold Chloride	$NaAuCl_4,2H_2O$	398·06
Gold Sodium Thiosulphate	$Na_3Au(S_2O_3)_2,2H_2O$	526·46
Guaiacol	$C_7H_8O_2$	124·06
Guaiacol Carbonate	$C_{15}H_{14}O_5$	274·11
Hexamine	$C_6H_{12}N_4$	140·13

Molecular Weights—*Continued.*

Homatropine	$C_{16}H_{21}O_3N$	275·17
Homatropine Hydrobromide	$C_{16}H_{21}O_3N,HBr$	356·09
Hydrastine	$C_{21}H_{21}O_6N$	383·17
Hydrastine Hydrochloride	$C_{21}H_{21}O_6N,HCl$	419·63
Hydrogen Peroxide	H_2O_2	34·02
Hydrogen Sulphide	H_2S	34·08
Hyoscine	$C_{17}H_{21}O_4N$	303·17
Hyoscine Hydrobromide	$C_{17}H_{21}O_4N,HBr,3H_2O$	438·14
Hyoscyamine	$C_{17}H_{23}O_3N$	289·19
Hyoscyamine Hydrobromide	$C_{17}H_{23}O_3N,HBr$	370·11
Hyoscyamine Sulphate	$(C_{17}H_{23}O_3N)_2,H_2SO_4$	676·45
Indigo Carmine	$C_{16}H_8O_8N_2S_2Na_2$	466·19
Iodoform	CHI_3	393·77
Iodopyrrol	C_4HNI_4	570·70
Lactose	$C_{12}H_{22}O_{11},H_2O$	360·19
Lævulose	$C_6H_{12}O_6$	180·09
Lead Acetate	$C_4H_6O_4Pb,3H_2O$	379·31
Lead Carbonate, Basic	$2PbCO_3,Pb(OH)_2$	775·68
Lead Iodide	PbI_2	461·06
Lead Monoxide	PbO	223·22
Lead Sulphate	$PbSO_4$	303·28
Lead Sulphide	PbS	239·28
Limonene	$C_{10}H_{16}$	136·12
Linalyl Acetate	$C_{12}H_{20}O_2$	196·16
Lithium Acetylsalicylate	$C_9H_7O_4Li$	185·99
Lithium Benzoate	$C_7H_5O_2Li$	127·98
Lithium Bromide	$LiBr$	86·86
Lithium Carbonate	Li_2CO_3	73·88
Lithium Chloride	$LiCl$	42·40
Lithium Citrate	$C_6H_5O_7Li_3,4H_2O$	281·92
Lithium Hippurate	$C_9H_8O_3NLi,2H_2O$	221·04
Lithium Iodide	LiI	133·86
Lithium Salicylate	$C_7H_5O_3Li$	143·98
Magnesium Bromide	$MgBr_2,6H_2O$	292·25
Magnesium Chloride	$MgCl_2,6H_2O$	203·33
Magnesium Chloride (anhydrous)	$MgCl_2$	95·23
Magnesium Glycerophosphate	$C_3H_7O_6PMg,2H_2O$	230·43
Magnesium Hydroxide	$Mg(OH)_2$	58·34
Magnesium Oxide	MgO	40·32
Magnesium Peroxide	MgO_2	56·32
Magnesium Phosphate (anhydrous)	$Mg_3(PO_4)_2$	263·00
Magnesium Pyrophosphate	$Mg_2P_2O_7$	222·68
Magnesium Salicylate	$C_{14}H_{10}O_6Mg,4H_2O$	370·46
Magnesium Sulphate	$MgSO_4,7H_2O$	246·49

Molecular Weights—*Continued.*

Magnesium Sulphate (anhydrous)	$MgSO_4$	120·38
Maltose	$C_{12}H_{22}O_{11},H_2O$	360·19
Manganese Chloride	$MnCl_2,4H_2O$	197·91
Manganese Dioxide	MnO_2	86·93
Manganese Glycerophosphate	$C_3H_7O_6PMn$	225·00
Manganese Hypophosphite	$Mn(PH_2O_2)_2,H_2O$	203·02
Manganese Sulphate	$MnSO_4,4H_2O$	223·05
Menthol	$C_{10}H_{20}O$	156·16
Menthyl Acetate	$C_{12}H_{22}O_2$	198·17
Mercuric Chloride	$HgCl_2$	271·52
Mercuric Cyanide	$Hg(CN)_2$	252·63
Mercuric Iodide	HgI_2	454·45
Mercuric Oxide	HgO	216·61
Mercuric Oxycyanide	$HgO,3Hg(CN)_2$	974·49
Mercuric Sulphate	$HgSO_4$	296·67
Mercuric Sulphide	HgS	232·67
Mercurous Chloride	$HgCl$	236·07
Mercurous Iodide	HgI	327·53
Mercurous Sulphate	Hg_2SO_4	497·28
Mercury, Ammoniated	NH_2HgCl	252·09
Metaphenylenediamine Hydrochloride	$C_6H_8N_2,2HCl$	180·99
Methylacetanilide	$C_9H_{11}ON$	149·09
Methyl Bromide	CH_3Br	94·94
Methyl Chloride	CH_3Cl	50·48
Methyl Iodide	CH_3I	141·94
Methyl Orange	$C_{14}H_{14}O_3N_3SNa$	327·19
Methyl Red	$C_{15}H_{15}O_2N_3$	269·14
Methyl Salicylate	$C_8H_8O_3$	152·06
Methylene Blue	$C_{16}H_{18}N_3ClS$	319·68
Methylsulphonal	$C_8H_{18}O_4S_2$	242·26
Morphine	$C_{17}H_{19}O_3N,H_2O$	303·17
Morphine (anhydrous)	$C_{17}H_{19}O_3N$	285·16
Morphine Acetate	$C_{17}H_{19}O_3N,C_2H_4O_2,3H_2O$	399·23
Morphine Hydrochloride	$C_{17}H_{19}O_3N,HCl,3H_2O$	375·67
Morphine Hydrochloride (anhydrous)	$C_{17}H_{19}O_3N,HCl$	321·62
Morphine Sulphate	$(C_{17}H_{19}O_3N)_2,H_2SO_4,5H_2O$	758·47
Morphine Sulphate (anhydrous)	$(C_{17}H_{19}O_3N)_2,H_2SO_4$	668·39
Morphine Tartrate	$(C_{17}H_{19}O_3N)_2,C_4H_6O_6,3H_2O$	774·41
Naphthalene	$C_{10}H_8$	128·06
Naphthalene Tetrachloride	$C_{10}H_8Cl_4$	269·89
Narcotine	$C_{22}H_{23}O_7N$	413·19
Nickel Oxide	NiO	74·69

Molecular Weights—*Continued.*

Nickel Sulphate	$NiSO_4,7H_2O$	280·86
Nickel Sulphate (anhydrous)	$NiSO_4$	154·75
Nicotine	$C_{10}H_{14}N_2$	162·13
Nitric Oxide	NO	30·01
Nitrobenzene	$C_6H_5O_2N$	123·05
Nitrous Oxide	N_2O	44·02
Orthocaine	$C_8H_9O_3N$	167·08
Papaverine	$C_{20}H_{21}O_4N$	339·17
Papaverine Hydrochloride	$C_{20}H_{21}O_4N,HCl$	375·64
Papaverine Sulphate	$(C_{20}H_{21}O_4N)_2,H_2SO_4$	776·42
Paraformaldehyde	$(CH_2O)_3$	90·05
Phenacetin	$C_{10}H_{13}O_2N$	179·11
Phenazone	$C_{11}H_{12}ON_2$	188·11
Phenazone Salicylate	$C_{11}H_{12}ON_2,C_7H_6O_3$	326·16
Phenobarbitone	$C_{12}H_{12}O_3N_2$	232·11
Phenobarbitone, Soluble	$C_{12}H_{11}O_3N_2Na$	254·10
Phenol	C_6H_6O	94·05
Phenol Red	$C_{19}H_{14}O_5S$	354·17
Phenolphthalein	$C_{20}H_{14}O_4$	318·11
Phenylhydrazine	$C_6H_8N_2$	108·08
Phenylhydrazine Hydrochloride	$C_6H_8N_2,HCl$	144·54
Phloroglucinol	$C_6H_6O_3$	126 05
Physostigmine	$C_{15}H_{21}O_2N_3$	275·19
Physostigmine Salicylate	$C_{15}H_{21}O_2N_3,C_7H_6O_3$	413·23
Physostigmine Sulphate	$(C_{15}H_{21}O_2N_3)_2,H_2SO_4$	648·46
Pilocarpine	$C_{11}H_{16}O_2N_2$	208·14
Pilocarpine Hydrobromide	$C_{11}H_{16}O_2N_2,HBr$	289 06
Pilocarpine Hydrochloride	$C_{11}H_{16}O_2N_2,HCl$	244·60
Pilocarpine Nitrate	$C_{11}H_{16}O_2N_2,HNO_3$	271·16
Piperidine	$C_5H_{11}N$	85·09
Piperine	$C_{17}H_{19}O_3N$	285·16
Platinic Chloride	$PtCl_4$	337·06
Potassium Acetate	$C_2H_3O_2K$	98·12
Potassium Acid Phosphate	KH_2PO_4	136·13
Potassium Acid Sulphate	$KHSO_4$	136·16
Potassium Acid Tartrate	$C_4H_5O_6K$	188·14
Potassium Antimonyltartrate	$C_4H_4O_7SbK,\frac{1}{2}H_2O$	333·89
Potassium Benzoate	$C_7H_5O_2K,3H_2O$	214·18
Potassium Bicarbonate	$KHCO_3$	100·10
Potassium Binoxalate	$C_2HO_4K,2H_2O$	164·14
Potassium Bromate	$KBrO_3$	167·01
Potassium Bromide	KBr	119·01
Potassium Carbonate	K_2CO_3	138·19
Potassium Chlorate	$KClO_3$	122·55
Potassium Chloride	KCl	74·55

Molecular Weights—*Continued.*

Potassium Chloroplatinate	K_2PtCl_6	486·16
Potassium Chromate	K_2CrO_4	194·20
Potassium Citrate	$C_6H_5O_7K_3,H_2O$	324·34
Potassium Citrate (anhydrous)	$C_6H_5O_7K_3$	306·33
Potassium Cyanide	KCN	65·10
Potassium Dichromate	$K_2Cr_2O_7$	294·21
Potassium Ferricyanide	$K_3FeC_6N_6$	329·18
Potassium Ferrocyanide	$K_4FeC_6N_6,3H_2O$	422·30
Potassium Formate	CHO_2K	84·10
Potassium Glycerophosphate	$C_3H_7O_6PK_2,3H_2O$	302·31
Potassium Guaiacolsulphonate	$C_7H_7O_5SK$	242·21
Potassium Hippurate	$C_9H_8O_3NK,H_2O$	235·18
Potassium Hydroxide	KOH	56·10
Potassium Hypophosphite	KPH_2O_2	104·13
Potassium Iodate	KIO_3	214·02
Potassium Iodide	KI	166·02
Potassium Nitrate	KNO_3	101·10
Potassium Oxalate	$C_2O_4K_2$	166·19
Potassium Perchlorate	$KClO_4$	138·55
Potassium Permanganate	$KMnO_4$	158·03
Potassium Persulphate	$K_2S_2O_8$	270·31
Potassium Phosphate	K_2HPO_4	174·22
Potassium Pyrosulphite	$K_2S_2O_5$	222·31
Potassium Quadroxalate	$C_4H_3O_8K,2H_2O$	254·14
Potassium Salicylate	$C_7H_5O_3K$	176·14
Potassium Sulphate	K_2SO_4	174·25
Potassium Tartrate	$(C_4H_4O_6K_2)_2,H_2O$	470·46
Potassium Tartrate (anhydrous)	$C_4H_4O_6K_2$	226·22
Potassium Thiocyanate	KSCN	97·16
Procaine Hydrochloride	$C_{13}H_{20}O_2N_2,HCl$	272·64
Proflavine	$C_{13}H_{11}N_3,H_2SO_4$	307·19
Pyrogallol	$C_6H_6O_3$	126·05
Quinidine	$C_{20}H_{24}O_2N_2,2H_2O$	360·23
Quinidine (anhydrous)	$C_{20}H_{24}O_2N_2$	324·20
Quinidine Sulphate	$(C_{20}H_{24}O_2N_2)_2,H_2SO_4,2H_2O$	782·51
Quinidine Sulphate (anhydrous)	$(C_{20}H_{24}O_2N_2)_2,H_2SO_4$	746·48
Quinine	$C_{20}H_{24}O_2N_2,3H_2O$	378·25
Quinine (anhydrous)	$C_{20}H_{24}O_2N_2$	324·20
Quinine Acetylsalicylate	$C_{20}H_{24}O_2N_2,C_9H_8O_4$	504·26
Quinine Arsenate	$(C_{20}H_{24}O_2N_2)_2,H_3AsO_4,8H_2O$	934·46
Quinine Benzoate	$C_{20}H_{24}O_2N_2,C_7H_6O_2$	446·25
Quinine Bisulphate	$C_{20}H_{24}O_2N_2,H_2SO_4,7H_2O$	548·39
Quinine Bisulphate (anhydrous)	$C_{20}H_{24}O_2N_2,H_2SO_4$	422·28

Molecular Weights—*Continued.*

Quinine Citrate	$(C_{20}H_{24}O_2N_2)_3,C_6H_8O_7,7\frac{1}{2}H_2O$	1299·77
Quinine Dihydriodide	$C_{20}H_{24}O_2N_2,2HI,5H_2O$	670·14
Quinine Dihydrobromide	$C_{20}H_{24}O_2N_2,2HBr,3H_2O$	540·09
Quinine Dihydrochloride	$C_{20}H_{24}O_2N_2,2HCl$	397·13
Quinine Disalicylosalicylate	$C_{20}H_{24}O_2N_2,C_{28}H_{20}O_{10}$	840·36
Quinine Ethyl Carbonate	$C_{23}H_{28}O_4N_2$	396·23
Quinine Glycerophosphate	$(C_{20}H_{24}O_2N_2)_2,C_3H_9O_6P,4H_2O$	892·55
Quinine Hydriodide	$C_{20}H_{24}O_2N_2,HI$	452·13
Quinine Hydrobromide	$C_{20}H_{24}O_2N_2,HBr,2H_2O$	441·16
Quinine Hydrobromide (anhydrous)	$C_{20}H_{24}O_2N_2,HBr$	405·12
Quinine Hydrochloride	$C_{20}H_{24}O_2N_2,HCl,2H_2O$	396·69
Quinine Hydrochloride (anhydrous)	$C_{20}H_{24}O_2N_2,HCl$	360·66
Quinine Hypophosphite	$C_{20}H_{24}O_2N_2,H_3PO_2,2H_2O$	426·27
Quinine Lactate	$C_{20}H_{24}O_2N_2,C_3H_6O_3$	414·25
Quinine Phosphate	$(C_{20}H_{24}O_2N_2)_3,2H_3PO_4,6H_2O$	1276·78
Quinine Salicylate	$C_{20}H_{24}O_2N_2,C_7H_6O_3,H_2O$	480·26
Quinine Sulphate	$(C_{20}H_{24}O_2N_2)_2,H_2SO_4,7\frac{1}{2}H_2O$	881·60
Quinine Sulphate (anhydrous)	$(C_{20}H_{24}O_2N_2)_2,H_2SO_4$	746·48
Quinine Valerianate	$C_{20}H_{24}O_2N_2,C_5H_{10}O_2,H_2O$	444·29
Resorcinol	$C_6H_6O_2$	110·05
Saccharin	$C_7H_5O_3NS$	183·11
Saccharin, Soluble	$C_7H_4O_3NSNa,2H_2O$	241·13
Safrole	$C_{10}H_{10}O_2$	162·08
Salicin	$C_{13}H_{18}O_7$	286·14
Salol	$C_{13}H_{10}O_3$	214·08
Santalol	$C_{15}H_{24}O$	220·19
Santonin	$C_{15}H_{18}O_3$	246·14
Silver Chloride	$AgCl$	143·34
Silver Cyanide	$AgCN$	133·89
Silver Iodide	AgI	234·80
Silver Nitrate	$AgNO_3$	169·89
Silver Oxide	Ag_2O	231·76
Sodium Acetate	$C_2H_3O_2Na,3H_2O$	136·07
Sodium Acetate (anhydrous)	$C_2H_3O_2Na$	82·02
Sodium Acid Phosphate	$NaH_2PO_4,2H_2O$	156·06
Sodium Acid Phosphate (anhydrous)	NaH_2PO_4	120·03
Sodium Acid Pyrophosphate	$Na_2H_2P_2O_7$	222 05
Sodium Acid Tartrate	$C_4H_5O_6Na,H_2O$	190·05
Sodium Aminarsonate (anhydrous)	$C_6H_7O_3NAsNa$	238·97
Sodium Antimonyltartrate	$C_4H_4O_7SbNa$	308·79
Sodium Arsenate	$Na_2HAsO_4,7H_2O$	312·02
Sodium Arsenate (anhydrous)	Na_2HAsO_4	185·91

Molecular Weights—*Continued.*

Sodium Benzoate	$C_7H_5O_2Na$	144·04
Sodium Bicarbonate	$NaHCO_3$	84·00
Sodium Bromate	$NaBrO_3$	150·91
Sodium Bromide	$NaBr$	102·91
Sodium Cacodylate	$C_2H_6O_2AsNa,3H_2O$	214·00
Sodium Cacodylate (anhydrous)	$C_2H_6O_2AsNa$	159·95
Sodium Carbonate	$Na_2CO_3,10H_2O$	286·15
Sodium Carbonate (anhydrous)	Na_2CO_3	105·99
Sodium Carbonate (monohydrate)	Na_2CO_3,H_2O	124·01
Sodium Chlorate	$NaClO_3$	106·45
Sodium Chloride	$NaCl$	58·45
Sodium Citrate	$C_6H_5O_7Na_3,2H_2O$	294·06
Sodium Citrate (anhydrous)	$C_6H_5O_7Na_3$	258·03
Sodium Cyanide	$NaCN$	49·01
Sodium Fluoride	NaF	42·00
Sodium Formate	CHO_2Na,H_2O	86·02
Sodium Glycerophosphate	$C_3H_7O_6PNa_2,5\frac{1}{2}H_2O$	315·15
Sodium Glycerophosphate (anhydrous)	$C_3H_7O_6PNa_2$	216·07
Sodium Hippurate	$C_9H_8O_3NNa$	201·07
Sodium Hydroxide	$NaOH$	40·00
Sodium Hypophosphite	$NaPH_2O_2,H_2O$	106·05
Sodium Hypophosphite (anhydrous)	$NaPH_2O_2$	88·03
Sodium Iodide	NaI	149·92
Sodium Nitrate	$NaNO_3$	85·01
Sodium Nitrite	$NaNO_2$	69·01
Sodium Oxalate	$C_2O_4Na_2$	133·99
Sodium Perborate	$NaBO_3,4H_2O$	153·88
Sodium Perborate (anhydrous)	$NaBO_3$	81·82
Sodium Phenolsulphonate	$C_6H_5O_4SNa,2H_2O$	232·13
Sodium Phosphate	$Na_2HPO_4,12H_2O$	358·21
Sodium Phosphate (anhydrous)	Na_2HPO_4	142·02
Sodium Potassium Tartrate	$C_4H_4O_6NaK,4H_2O$	282·19
Sodium Pyrophosphate	$Na_4P_2O_7,10H_2O$	446·18
Sodium Pyrophosphate (anhydrous)	$Na_4P_2O_7$	266·03
Sodium Pyrosulphite	$Na_2S_2O_5$	190·11
Sodium Salicylate	$C_7H_5O_3Na$	160·04
Sodium Silicofluoride	Na_2SiF_6	188·05
Sodium Sulphate	$Na_2SO_4,10H_2O$	322·21
Sodium Sulphate (anhydrous)	Na_2SO_4	142·05

Molecular Weights—*Continued.*

Sodium Sulphite	$Na_2SO_3,7H_2O$	252·16
Sodium Sulphite (anhydrous)	Na_2SO_3	126·05
Sodium Tartrate	$C_4H_4O_6Na_2,2H_2O$	230·06
Sodium Tartrate (anhydrous)	$C_4H_4O_6Na_2$	194·03
Sodium Thiosulphate	$Na_2S_2O_3,5H_2O$	248·19
Sodium Thiosulphate (anhydrous)	$Na_2S_2O_3$	158·11
Sparteine	$C_{15}H_{26}N_2$	234·22
Sparteine Sulphate	$C_{15}H_{26}N_2,H_2SO_4,5H_2O$	422·38
Sparteine Sulphate (anhydrous)	$C_{15}H_{26}N_2,H_2SO_4$	332·30
Stannic Oxide	SnO_2	150·70
Stannous Chloride	$SnCl_2,2H_2O$	225·65
Stannous Chloride (anhydrous)	$SnCl_2$	189·61
Stannous Sulphide	SnS	150·76
Strontium Bromide	$SrBr_2,6H_2O$	355·56
Strontium Carbonate	$SrCO_3$	147·63
Strontium Chloride	$SrCl_2,6H_2O$	266·64
Strontium Iodide	$SrI_2,6H_2O$	449·59
Strychnine	$C_{21}H_{22}O_2N_2$	334·19
Strychnine Acid Sulphate	$C_{21}H_{22}O_2N_2,H_2SO_4,2H_2O$	468·30
Strychnine Hydrochloride	$C_{21}H_{22}O_2N_2,HCl,2H_2O$	406·68
Strychnine Sulphate	$(C_{21}H_{22}O_2N_2)_2,H_2SO_4,5H_2O$	856·53
Sucrose	$C_{12}H_{22}O_{11}$	342·17
Sulphonal	$C_7H_{16}O_4S_2$	228·24
Sulphur Dioxide	SO_2	64·06
Sulphur Trioxide	SO_3	80·06
Terpineol	$C_{10}H_{18}O$	154·14
Terpin Hydrate	$C_{10}H_{20}O_2,H_2O$	190·17
Terpinol	$C_{10}H_{16}$	136·12
Tetrachlorethane	$C_2H_2Cl_4$	167·84
Tetrachlorethylene	C_2Cl_4	165·83
Thallium Acetate	$C_2H_3O_2Tl$	263·41
Theobromine	$C_7H_8O_2N_4$	180·09
Theophylline	$C_7H_8O_2N_4,H_2O$	198·11
Thiosinamine	$C_4H_8N_2S$	116·14
Thymol	$C_{10}H_{14}O$	150·11
Thymol Iodide	$C_{20}H_{24}O_2I_2$	550·03
Thyroxine-sodium	$C_{15}H_{10}O_4NI_4Na$	798·81
Toluene	C_7H_8	92·06
Trichlorethylene	C_2HCl_3	131·38
Trinitrophenol	$C_6H_3O_7N_3$	229·05
Uranium Nitrate	$UO_2(NO_3)_2,6H_2O$	502·25
Urea	CH_4ON_2	60·05
Urethane	$C_3H_7O_2N$	89·06
Vanillin	$C_8H_8O_3$	152·06

Molecular Weights—*Continued.*

Water	H_2O	18·0156
Xylene	C_8H_{10}	106·08
Yohimbine	$C_{21}H_{26}O_3N_2$	354·22
Yohimbine Hydrochloride	$C_{21}H_{26}O_3N_2,HCl$	390·68
Zinc Acetate	$C_4H_6O_4Zn,2H_2O$	219·46
Zinc Acetate (anhydrous)	$C_4H_6O_4Zn$	183·43
Zinc Bromide	$ZnBr_2$	225·21
Zinc Carbonate	$ZnCO_3$	125·38
Zinc Chloride	$ZnCl_2$	136·29
Zinc Iodide	ZnI_2	319·22
Zinc Oxide	ZnO	81·38
Zinc Permanganate	$ZnMn_2O_8,6H_2O$	411·33
Zinc Phenolsulphonate	$C_{12}H_{10}O_8S_2Zn,8H_2O$	555·70
Zinc Phenolsulphonate (anhydrous)	$C_{12}H_{10}O_8S_2Zn$	411·58
Zinc Phosphide	Zn_3P_2	258·18
Zinc Sulphate	$ZnSO_4,7H_2O$	287·55
Zinc Sulphate (anhydrous)	$ZnSO_4$	161·44
Zinc Sulphide	ZnS	97·44
Zinc Valerianate	$C_{10}H_{18}O_4Zn,2H_2O$	303·55

APPENDIX VI

Reagents

In the following list are given the strengths of reagent solutions in frequent use in testing the substances of the British Pharmaceutical Codex, together with reagents not included in the British Pharmacopœia and for which the strength is not prescribed in the test. The list includes also a number of other reagents or substances which are in fairly frequent use either as diagnostic reagents or in clinical testing generally.

Unless expressly stated otherwise, dehydrated alcohol, alcohol (95 per cent.), or the dilute alcohols, when required in any tests or assays, or in the preparation of reagent solutions, may be replaced by industrial methylated spirit of equivalent alcoholic strength, provided that the law and the statutory regulations governing the use of industrial methylated spirit are observed. Industrial methylated spirit must not be used for solubility tests.

Acetic Acid: approximately 33 per cent. w/w of $CH_3 \cdot COOH$ in water.

Acetic Acid, Dilute: approximately 6 per cent. w/w of $CH_3 \cdot COOH$ in water.

Albumen Solution: a solution of the liquid white of fresh eggs in water.

Alcohol (90 per cent.): alcohol (90 per cent ; s.g. 0·832 to 0·835).

Alkali Blue Solution: a 0·1 per cent. w/v solution of alkali blue (a mixture of the sodium sulphonates of phenylated rosaniline and pararosaniline) in alcohol (90 per cent.); colour change, from blue to red with strong alkali in alcoholic solution.

Alkanna, Tincture of: 1 part by weight of alkanna extracted by maceration with 5 parts by volume of alcohol (90 per cent.).

Alum Solution: 5 per cent. w/v of potash alum or ammonia alum in water.

Ammonia Solution, 2N: an aqueous dilution of strong solution of ammonia containing in 1000 millilitres 34·06 grammes of NH_3.

Ammonia Solution, Dilute: approximately 10 per cent. w/v of NH_3 in water.

Ammonium Acetate Solution: 5 per cent. w/v of ammonium acetate in water.

Ammonium Carbonate Solution: 5 per cent. w/v of ammonium carbonate with 7·5 per cent. v/v of dilute ammonia solution in water.

Ammonium Chloride Solution: 10 per cent. w/v of ammonium chloride in water.

Reagents—*Continued.*

Ammonium Chloride Solution (Nessler's): 0·315 per cent. w/v of ammonium chloride in ammonia-free water.

Ammonium Chloride Solution (Nessler's), Dilute: a 1 in 100 dilution of ammonium chloride solution (Nessler's) in ammonia-free water.

Ammonium Hydrosulphide Solution: 60 per cent. v/v of dilute ammonia solution saturated with washed hydrogen sulphide, with 40 per cent. v/v of dilute ammonia solution; it should be recently prepared.

Ammonium Molybdate Solution: 10 per cent. w/v of ammonium molybdate in water.

Ammonium Oxalate Solution: 2·5 per cent. w/v of ammonium oxalate in water.

Ammonium Phosphate Solution: 10 per cent. w/v of ammonium phosphate in water.

Ammonium Thiocyanate Solution: 10 per cent. w/v of ammonium thiocyanate in water.

Ammonium Thiocyanate Solution, N/10: an aqueous solution of ammonium thiocyanate containing in 1000 millilitres 7·611 grammes of NH_4SCN.

Aniline Hydrochloride Solution: a freshly prepared 2 per cent. w/v solution of aniline hydrochloride in 58·5 per cent. alcohol with 2 per cent. w/v of hydrochloric acid.

Auric Chloride Solution: 2 per cent. w/v of gold chloride, $NaAuCl_4$, $2H_2O$, in water.

Azur-Eosin Solution: *Synonym.*—Giemsa's Stain: 3 grammes of azur II-eosin and 0·8 gramme of azur II dissolved in a mixture of 250 millilitres of glycerin and 250 millilitres of methyl alcohol.

Barium Chloride Solution: 10 per cent. w/v of barium chloride in water.

Barium Hydroxide Solution: 3 per cent. w/v of barium hydroxide, $Ba(OH)_2,8H_2O$, in water.

Barium Nitrate Solution: 10 per cent. w/v of barium nitrate in water.

Benzidine Solution: 1 per cent. w/v of benzidine (*p*-diaminodiphenyl, $NH_2C_6H_4{\cdot}C_6H_4NH_2$) in alcohol (90 per cent.).

Benzidine Solution, Acetic: a freshly prepared saturated solution of benzidine in glacial acetic acid.

Benzidine Solution, Alcoholic: a saturated solution of benzidine in alcohol (95 per cent.).

Blood Diluting Solution: *Synonym.*—Gower's Hæmocytometer Solution: 5·42 grammes of sodium sulphate in a mixture of 3·125 grammes of acetic acid and 1000 millilitres of water.

Reagents—*Continued.*

Blood Diluting Solution: *Synonym.*—Hayem's Solution: 10 grammes of sodium chloride, 25 grammes of sodium sulphate and 2·5 grammes of mercuric chloride in water to 1000 millilitres.

Blood Diluting Solution: *Synonym.*—Toison's Solution: 1 gramme of sodium chloride and 8 grammes of sodium sulphate in 80 millilitres of water added to a solution of 0 025 gramme of methyl violet in a mixture of 30 millilitres of glycerin and 80 millilitres of water. Filter immediately before use.

Bromine Solution: a saturated solution of bromine in water.

Bromine Solution, N/10: 3 grammes of potassium bromate and 50 grammes of potassium bromide in water to produce 1000 millilitres, and adjusted so that 1000 millilitres, acidified, yields 7·992 grammes of Br.

Bromocresol Green Solution: 0·1 gramme of bromocresol green (tetrabromo-*m*-cresolsulphonephthalein) warmed with 2·9 millilitres of N/20 sodium hydroxide and 5 millilitres of alcohol (90 per cent.) until dissolved, and diluted with alcohol (20 per cent.) to 250 millilitres. *p*H range, 3·6 to 5·2. Colour change, yellow in acid solutions to blue-violet in weakly acid and alkaline solutions.

Bromocresol Purple Solution: 0·1 gramme of bromocresol purple (dibromo-*o*-cresolsulphonephthalein) warmed with 3·7 millilitres of N/20 sodium hydroxide and 5 millilitres of alcohol (90 per cent.) until dissolved, and diluted with alcohol (20 per cent.) to 250 millilitres. *p*H range, 5·2 to 6·8. Colour change, yellow in acid solutions to purple in neutral or alkaline solutions.

Bromophenol Blue Solution: 0·1 gramme of bromophenol blue (tetrabromophenolsulphonephthalein) warmed with 3 millilitres of N/20 sodium hydroxide and 5 millilitres of alcohol (90 per cent.) until dissolved, and diluted with alcohol (20 per cent.) to 250 millilitres. *p*H range, 2·8 to 4·6. Colour change, yellow in acid solutions to blue-violet in weakly acid and alkaline solutions.

Bromothymol Blue Solution: 0·1 gramme of bromothymol blue (dibromothymolsulphonephthalein) warmed with 3·2 millilitres of N/20 sodium hydroxide and 5 millilitres of alcohol (90 per cent.) until dissolved, and diluted with alcohol (20 per cent.) to 250 millilitres. *p*H range, 6·0 to 7·6. Colour change, yellow in acid solutions, green indicating neutrality, to blue in alkaline solutions.

Cadmium Iodide Solution: 5 per cent. w/v of cadmium iodide in water.

Calcium Chloride Solution: 10 per cent. w/v of calcium chloride, $CaCl_2,6H_2O$, in water.

Calcium Hydroxide Solution: a saturated solution of calcium hydroxide in water.

Reagents—*Continued.*

Calcium Sulphate Solution: a saturated solution of calcium sulphate in water.

Carbol-Fuchsine Solution: 1 gramme of magenta dissolved in 10 millilitres of dehydrated alcohol and mixed with 5 grammes of phenol dissolved in 90 millilitres of distilled water, and filtered.

Carbol-Gentian Violet Solution: 1 gramme of methyl violet and 5 grammes of phenol dissolved in 5 grammes of dehydrated alcohol and 100 millilitres of water.

Carbol-Thionine Blue Solution: 0·25 gramme of thionine blue dissolved in 10 millilitres of dehydrated alcohol and mixed with 0·6 gramme of phenol dissolved in 100 millilitres of water.

Chloral Hydrate and Glycerin: 12 grammes of chloral hydrate dissolved in 10 millilitres of glycerin.

Chloral Hydrate Solution: 50 grammes of chloral hydrate dissolved in 20 millilitres of water.

Chloral Hydrate with Iodine Solution: 50 grammes of chloral hydrate dissolved in 20 millilitres of water in contact with excess of iodine.

Chlorinated Lime Solution: 10 per cent. of chlorinated lime in water, shaken occasionally for three hours and filtered through calico.

Chlorinated Soda Solution: 150 grammes of sodium carbonate in 250 millilitres of water mixed with 100 grammes of chlorinated lime triturated with 750 millilitres of water, shaken occasionally during three hours, and filtered.

Chlor-Zinc-Iodine Solution: *Synonym.*—Schulze's Solution. 100 millilitres of solution of zinc chloride evaporated to 70 millilitres, 10 grammes of potassium iodide dissolved in the residue and 0·2 gramme of iodine shaken with this solution in a stoppered bottle until the solution is saturated with iodine.

Chromic Acid Solution: 25 per cent. w/v of chromium trioxide in water.

Chromic and Nitric Acids Solution: 10 grammes of chromium trioxide and 10 millilitres of nitric acid in water sufficient to produce 100 millilitres.

Cobalt Nitrate Solution: 10 per cent. w/v of cobalt nitrate in water.

Cochineal, Tincture of: macerate 1 part of crushed cochineal with 10 parts of alcohol (45 per cent.). *p*H range, 5 to 6. Colour change, brownish-yellow in acid solution to purple in weakly acid and alkaline solutions.

Congo-red: sodium diphenylbisazobisnaphthylamine-4-sulphonate. *p*H range, 3 to 5. Colour change, blue in moderately acid solutions to red in weakly acid and alkaline solutions.

Reagents—*Continued.*

Copper Acetate Solution, Dilute: 0·05 per cent. w/v of copper acetate in water.

Copper Acetate Solution, Strong: 5 per cent. w/v of copper acetate in water.

Copper Oxide Solution, Ammoniacal: freshly prepared by occasionally shaking, during twelve hours, 5 grammes of copper carbonate with 100 millilitres of strong ammonia solution, setting aside for twenty-four hours, and pouring off the clear liquid.

Copper Solution, Alkaline: (for the determination of blood sugar by MacLean's method): 30 grammes of potassium bicarbonate is dissolved in about 200 millilitres of distilled water with the aid of gentle heat (not above 37°) and 20 grammes of anhydrous potassium carbonate added, followed by a solution of 0·875 gramme of copper sulphate dissolved in a few millilitres of water; the liquid is warmed until effervescence ceases and the potassium carbonate is dissolved, when 0·125 gramme of potassium iodate and 1·25 grammes of potassium iodide are added and distilled water to 250 millilitres. It is used in conjunction with solution of dialysed iron, acid sodium sulphate solution, N/400 sodium thiosulphate, solution of sulphuric acid, 25 per cent. v/v, and solution of soluble starch, 1 per cent. w/v.

Copper Sulphate Solution: 10 per cent. w/v of copper sulphate in water.

Corallin Solution, Alkaline: *Synonym.*—Corallin-Soda: freshly prepared by dissolving 30 grammes of sodium carbonate in 70 millilitres of water, adding a small quantity of corallin (the sodium derivative of rosolic acid), and shaking.

Cotton Blue and Lactophenol Solution: 1 gramme of cotton blue added to a solution of 50 grammes of phenol in a mixture of 50 millilitres of lactic acid, 50 millilitres of glycerin and 50 millilitres of water; the mixture is allowed to stand and the clear liquid used.

Cresol Red Solution: 0·05 gramme of cresol red (*o*-cresolsulphonephthalein) warmed with 2·65 millilitres of N/20 sodium hydroxide and 5 millilitres of alcohol (90 per cent.) until dissolved, and diluted with alcohol (20 per cent.) to 250 millilitres. *p*H range, 7·2 to 8·8. Colour change, yellow in acid or neutral solutions to red in alkaline solutions.

Cuprous Chloride Solution, Acid: 20 per cent. w/v of cuprous chloride in hydrochloric acid.

Dextrose-Pyridine Solution, Alkaline: *Synonym.*—Takayama's Solution (for the microscopical detection of blood stains): a mixture of 3 millilitres of 10 per cent. w/v aqueous solution of sodium hydroxide, 3 millilitres of pyridine, 3 millilitres of a saturated aqueous solution of dextrose and 7 millilitres of distilled water.

Reagents—*Continued.*

Diazo Test Solution: *Synonym.*—Ehrlich's Diazo Reagent (for the testing of urine in the diagnosis of typhoid fever and other diseases). (A) 0·1 gramme of sulphanilic acid dissolved in a mixture of 5 millilitres of hydrochloric acid and 95 millilitres of water. (B) 0·5 gramme of sodium nitrite dissolved in water to 100 millilitres. For use, mix 50 parts by volume of A with 1 part by volume of B.

Dimethylaminobenzaldehyde Solution: *Synonym.* — Ehrlich's Aldehyde Reagent (for the detection of urobilin): 2 grammes of *p*-dimethylaminobenzaldehyde dissolved in a mixture of equal volumes of hydrochloric acid and water to 100 millilitres.

Dimethylaminobenzaldehyde Solution: *Synonym.*—Töpfer's Reagent (for the detection of free hydrochloric acid in gastric contents): 0·5 gramme of *p*-dimethylaminobenzaldehyde in alcohol (95 per cent.) to 100 millilitres.

Dimethyl Yellow Solution: 0·2 per cent. w/v of dimethyl yellow (dimethylaminoazobenzene) in alcohol (90 per cent.). *p*H range, 2·8 to 4. Colour change, red in moderately acid solutions to yellow in weakly acid and alkaline solutions.

Diphenylamine Solution: 1 per cent. w/v of diphenylamine in nitrogen-free sulphuric acid. It gives a blue colour with nitric acid and other oxidising agents. When used as an indicator in the titration of ferrous salts with potassium dichromate the colour change is from bluish-green to dark blue when oxidation is complete.

Egg Medium: *Synonym.*—Dorset's Egg Medium: twelve fresh eggs are washed externally with water and then with solution of formaldehyde, and allowed to dry. The eggs are broken into a sterile cylinder and to 3 volumes of the mixed whites and yolks is added 1 volume of sterilised physiological solution of sodium chloride. The mixture is whisked in a sterile vessel, filtered through muslin, mixed, if desired, with a few drops of an alcoholic solution of magenta, transferred to tubes and heated at 75° for one hour. The tubes are incubated before use and any found to be contaminated are rejected.

Eosin Solution, Alcoholic: 1 gramme of eosin in a mixture of 30 millilitres of water and 70 millilitres of alcohol (95 per cent.).

Eosin Solution, Aqueous: 1 gramme of eosin in 100 millilitres of water.

Ether-Alcohol: a mixture of equal volumes of ether and alcohol (95 per cent.).

Ferric Ammonium Sulphate Solution: 10 per cent. w/v of ferric ammonium sulphate in water. It gives a deep red colour with ammonium thiocyanate.

Reagents—*Continued.*

Ferric Ammonium Sulphate Solution, N/10: an aqueous solution of ferric ammonium sulphate containing in 1000 millilitres ferric iron equivalent to 5·584 grammes of Fe.

Ferric Chloride Solution: 15 per cent. w/v of anhydrous ferric chloride, $FeCl_3$, in water.

Ferric Chloride Solution, Acid: *Synonym.*—Obermayer's Reagent (for the detection of indican): 1 gramme of ferric chloride in 500 millilitres of hydrochloric acid.

Ferrous Sulphate Solution, Acid: freshly prepared by dissolving 7 grammes of ferrous sulphate in 90 millilitres of freshly boiled and cooled water and adding sulphuric acid to 100 millilitres.

Ferrous Tartrate Solution: *Synonym.*—Mitchel's Reagent: 0·1 per cent. w/v of ferrous sulphate and 0·5 per cent. w/v of sodium potassium tartrate in water.

Gentian Violet in Aniline Water: 10 millilitres of saturated alcoholic solution of methyl violet mixed with 90 millilitres of water saturated with aniline.

Glucose-Agar Medium: 20 grammes of shredded agar dissolved with the aid of heat in 1000 millilitres of glucose broth. Sterilise by heating in an autoclave.

Glucose Broth: 20 grammes of dextrose in 1000 millilitres of nutrient broth. Sterilise by heating in an autoclave.

Glycerin, Dilute: 1 volume of glycerin mixed with 2 volumes of water.

Hæmatoxylin Solution: 1 per cent. w/v of hæmatoxylin in alcohol (60 per cent.). Colour change, yellow in moderately acid solutions to green or purple in weakly acid and alkaline solutions.

Hydrochloric Acid, Dilute: approximately 10 per cent. w/v of HCl in water.

Hydrochloric Acid, N/1: an aqueous solution of hydrochloric acid containing in 1000 millilitres 36·46 grammes of HCl.

Hydrochloric Acid PbT.: dilute hydrochloric acid with water until it contains from 25 to 27 per cent. of HCl. The solution complies with the B.P. test for dilute hydrochloric acid PbT., using 20 millilitres of reagent.

Hydrogen Sulphide Solution: recently prepared by saturating water with hydrogen sulphide.

Hypophosphorous Acid, Dilute: approximately 10 per cent. w/w of H_3PO_2 in water.

Reagents—*Continued.*

Indigo Carmine Solution: a solution of indigo carmine (about 0·03 per cent w/v) in 20 per cent. w/v solution of nitrogen-free sulphuric acid, adjusted so that 10 millilitres is decolourised by a solution of 0·001 gramme of potassium nitrate in 10 millilitres of water and 20 millilitres of sulphuric acid.

Iodide-Sulphate-Chloride Solution (for the determination of blood sugar by Hagedorn and Jensen's method): dissolve 10 grammes of zinc sulphate and 50 grammes of sodium chloride in water to 200 millilitres. When required for use, dissolve 1 gramme of potassium iodide in 40 millilitres of the solution. It is used in conjunction with N/10 sodium hydroxide, 0·45 per cent. w/v zinc sulphate solution, alkaline potassium ferricyanide solution, 1 per cent. w/v solution of soluble starch in saturated sodium chloride solution, and N/200 sodium thiosulphate.

Iodine Solution: 2 per cent. w/v of iodine and 3 per cent. w/v of potassium iodide in water.

Iodine Solution, Gram's: *Synonym.*—Gram's Iodine: 1 gramme of iodine and 2 grammes of potassium iodide in 300 millilitres of water.

Iodine Solution, N/10: a solution of iodine in an aqueous solution of potassium iodide containing in 1000 millilitres, 18·00 grammes of KI and 12·69 grammes of I.

Iodine Water: 1 volume of N/10 iodine solution mixed with 4 volumes of water.

Lactophenol Solution: 20 grammes of phenol dissolved in a mixture of 20 grammes of lactic acid, 40 grammes of glycerin and 20 millilitres of water.

Lactose-Bile-salt-Agar Medium: *Synonym.*—McConkey's Neutral Red Bile Salt Agar: 20 grammes of peptone, 10 grammes of lactose and 5 grammes of sodium taurocholate dissolved in 1000 millilitres of water with the aid of heat, adjusted to *p*H 7·0, and 20 grammes of shredded agar dissolved in the product with the aid of heat; to the liquid medium add 10 millilitres of 0·5 per cent. w/v solution of neutral red.

Lead Acetate Solution: 10 per cent. w/v of lead acetate in recently boiled water.

Lead Indicator, Alkaline: 1 gramme of lead acetate in about 20 millilitres of hot potassium hydroxide solution and diluted with water to 100 millilitres.

Lead Subacetate Solution: strong solution of lead subacetate diluted, if necessary, with water.

Leucocyte Diluting Solution: 10 millilitres of glacial acetic acid diluted with water to 1000 millilitres and coloured with methyl violet.

Reagents—*Continued.*

Lithium Phospho-tungstate Solution: *Synonym.*—Uric Acid Reagent (for the determination of uric acid in blood): add 100 grammes of sodium tungstate, $Na_2WO_4,2H_2O$, to a boiling mixture of 50 millilitres of phosphoric acid (s.g. about 1·75) and 160 millilitres of water and boil for one hour under a reflux condenser. Dissolve 25 grammes of lithium carbonate in 50 millilitres of phosphoric acid diluted with 200 millilitres of water and boil off the carbon dioxide. Mix the two solutions and add water to 1000 millilitres. It is used in conjunction with a 15 per cent. w/v solution of sodium cyanide in N/10 sodium hydroxide, and standard uric acid solution.

Litmus-Bile-salt Medium: *Synonym.*—McConkey's Medium (Double Strength) (for *B. coli communis*): 80 grammes of peptone triturated with 250 millilitres of water and added to 2000 millilitres of hot water in which has been dissolved 20 grammes of sodium taurocholate; the liquid is boiled for thirty minutes, cooled, and 20 grammes of lactose or dextrose added; the product is sterilised in a Koch steamer, adjusted to *p*H 7·4, and a sufficient quantity of litmus solution added. (This medium is sometimes prepared with neutral red instead of litmus.)

Litmus Solution: boil 10 grammes of litmus for 1 hour with 40 millilitres of alcohol (90 per cent.) and pour off the clear liquid; repeat the boiling, etc., twice with 30 millilitres of alcohol (90 per cent.). Digest the washed litmus with 100 millilitres of water, and filter. *p*H range, 5 to 8. Colour change, red with acids to blue with alkalis.

Magenta Solution, Decolourised: 1 gramme of magenta dissolved in 600 millilitres of hot water, cooled, and mixed with 10 grammes of anhydrous sodium sulphite dissolved in 100 millilitres of water, 10 millilitres of hydrochloric acid added, and diluted with water to 1000 millilitres; it should be protected from light.

Magnesium Ammonio-Sulphate Solution: *Synonym.*—Magnesia Mixture: 10 grammes of magnesium sulphate and 20 grammes of ammonium chloride dissolved in 80 millilitres of water, and 42 millilitres of dilute ammonia solution added; the mixture is set aside for a few days in a well-closed container, decanted and filtered.

Magnesium Sulphate Solution: 10 per cent. w/v of magnesium sulphate in water.

Mercuric Ammonium Thiocyanate Solution: 3 per cent. w/v of ammonium thiocyanate and 2·7 per cent. w/v of mercuric chloride in water.

Mercuric Chloride Solution: 5 per cent. w/v of mercuric chloride in water.

Reagents—*Continued.*

Mercuric Sulphate Solution: 5 grammes of yellow mercuric oxide mixed with 40 millilitres of water, and 20 millilitres of sulphuric acid added while stirring; 40 millilitres of water added and stirred until solution is completed.

Mercury Nitrate Solution: *Synonym.*—Millon's Reagent: recently prepared by dissolving 3 millilitres of mercury in 27 millilitres of fuming nitric acid without the aid of heat, and diluting with an equal volume of water.

Methyl Orange Solution: 0·04 per cent. w/v of methyl orange (sodium dimethylaminoazobenzenesulphonate) in alcohol (20 per cent.). *p*H range, 2·8 to 4. Colour change, red in moderately acid solutions to yellow in weakly acid and alkaline solutions.

Methyl Red Solution: 0·025 per cent. w/v of methyl red (dimethylaminoazobenzene-*o*-carboxylic acid) dissolved by warming with 0·95 millilitre of N/20 sodium hydroxide and 5 millilitres of alcohol (90 per cent.), and diluted with alcohol (20 per cent.) to 250 millilitres. *p*H range, 4·2 to 6·3. Colour change, red in weakly acid solutions to yellow in very weakly acid and alkaline solutions.

Methylene Blue Solution: *Synonym.*—Loeffler's Solution: 33 millilitres of a saturated alcoholic solution of methylene blue mixed with 100 millilitres of a 1 in 10,000 solution of potassium hydroxide.

Methylene Blue and Borax Solution: *Synonym.*—Sabouraud's Stain: 20 millilitres of 5 per cent. w/v aqueous solution of borax, 30 millilitres of saturated aqueous solution of methylene blue, and 50 millilitres of water.

Methylene Blue and Eosin Solution: *Synonym.*—Jenner's Stain (for staining blood films): 100 millilitres of a 0·5 per cent. w/v solution of methylene blue in dehydrated methyl alcohol mixed, when required for use, with 125 millilitres of a 0·05 per cent. w/v solution of eosin in dehydrated methyl alcohol.

Methylene Blue and Eosin Solution: *Synonym.*—Leishman's Stain (for staining blood films): a solution containing 1 per cent. of methylene blue and 0·5 per cent. of sodium carbonate in sterilised water is maintained at 65° for twelve hours and then allowed to stand for ten days at ordinary temperatures. It is then mixed with an equal volume of 0·1 per cent. w/v aqueous solution of eosin and allowed to stand with occasional stirring for six to twelve hours, when the precipitate is collected, washed, dried, and dissolved in dehydrated methyl alcohol to form a 0·2 per cent. w/v solution.

Methylene Blue and Vesuvine Solution: *Synonym.*—Neisser's Stain: (A) 0·1 gramme of methylene blue in a mixture of 2 millilitres of alcohol (95 per cent.), 5 millilitres of glacial acetic acid and 95 millilitres of water. (B) 0·2 gramme of vesuvine bismarck brown in 100 millilitres of water.

Reagents—*Continued.*

Nitric Acid Solution, Dilute: 10 per cent. w/w of HNO_3 in water.

Nitric Acid Solution, Strong: nitric acid diluted with an equal volume of water.

Nitric Acid, Fuming: specific gravity at 15·5°, about 1·5.

Nitric Acid PbT.: nitric acid which complies with the following test:—Make 5 grammes alkaline with solution of ammonia PbT., add 1 millilitre of solution of potassium cyanide PbT., dilute to 50 millilitres with water and add two drops of solution of sodium sulphide PbT.; no darkening is produced.

Nutrient Agar Medium: 20 grammes of shredded agar dissolved by the aid of heat in 1000 millilitres of nutrient broth. Sterilise by heating in an autoclave.

Nutrient Broth: 5 grammes of meat extract, 10 grammes of peptone and 5 grammes of sodium chloride boiled with 1000 millilitres of water for thirty minutes. The reaction of the solution is adjusted to *p*H 7·6, the volume adjusted to 1000 millilitres, and the liquid sterilised by heating in an autoclave.

Nutrient Broth: (for Rideal-Walker test): 20 grammes of peptone rubbed to a cream with water is added slowly to a boiling solution of 20 grammes of meat extract in 750 millilitres of water; 10 grammes of sodium chloride is added and the liquid boiled for thirty minutes, cooled, and water added to one litre. An aliquot portion is titrated at 37° with N/10 sodium hydroxide until neutral to phenolphthalein, and the calculated quantity of N/1 sodium hydroxide is then added very slowly to the remainder to render it neutral to phenolphthalein at 37°. The mixture is heated to the boiling-point and filtered while hot. By the addition of N/1 hydrochloric acid the reaction of the solution is adjusted to *p*H 7·6, using phenol red as indicator. The broth is sterilised by heating in an autoclave, filtered when cold, distributed into tubes each containing 5 millilitres, and again autoclaved. The final reaction of the broth is between *p*H 7·3 and *p*H 7·5.

Nutrient Gelatin Medium: 125 grammes of gelatin dissolved in 100 millilitres of nutrient broth and the reaction of the solution readjusted to *p*H 7·6. Sterilise by tyndallisation.

Orcinol Solution: *Synonym.*—Bial's Reagent (for the detection of pentoses in urine): 4 grammes of orcinol dissolved in 200 millilitres of alcohol (95 per cent.) and 5 millilitres of 10 per cent. w/v ferric chloride solution added. For use, add 0·5 millilitre of the solution to 5 millilitres of hydrochloric acid.

Osmic Acid Solution: 1 per cent. w/v of osmic acid in water. The solution must be protected from light.

Oxalic Acid Solution, N/1: an aqueous solution of oxalic acid containing in 1000 millilitres 63·02 grammes of $H_2C_2O_4,2H_2O$

Reagents—*Continued.*

Phenolphthalein Solution: 0·2 gramme of phenolphthalein dissolved in 60 millilitres of alcohol (90 per cent.) and water to 100 millilitres. *p*H range, 8·3 to 10. Colour change, colourless in acid and weakly alkaline solutions to red in more strongly alkaline solutions.

Phenolphthalin Solution: *Synonyms.*—Kastle-Meyer Reagent; Reduced Phenolphthalein Solution (for the detection of blood in urine, fæces, etc.): to a solution of 2 grammes of phenolphthalein and 20 grammes of potassium hydroxide in 100 millilitres of water add 10 grammes of zinc powder and boil until colourless; pour off the clear liquid, add water to 100 millilitres and then add a trace of zinc powder. Filter before use.

Phenol Red Solution: 0·05 gramme of phenol red (phenolsulphonephthalein) warmed with 2·85 millilitres of N/20 sodium hydroxide and 5 millilitres of alcohol (90 per cent.) until dissolved, and diluted with alcohol (20 per cent.) to 250 millilitres. *p*H range, 6·8 to 8·4. Colour change, yellow in neutral and very faintly acid solutions to red in weakly alkaline solutions.

Phenol Violet Solution: 0·15 gramme of thymol blue (thymolsulphonephthalein) and 0·025 gramme of phenolphthalein warmed with 3·25 millilitres of N/10 sodium hydroxide and 5 millilitres of alcohol (90 per cent.) until dissolved, and alcohol (20 per cent.) added to 250 millilitres. *p*H range, 8 to 10. Colour change, yellow in acid and weakly alkaline solutions to blue and finally violet as the alkalinity increases.

Phenoldisulphonic Acid: 15 grammes of phenol heated on a water-bath for six hours with 100 millilitres of sulphuric acid and transferred to a stoppered bottle.

Phloroglucinol Solution: 1 per cent. w/v of phloroglucinol in alcohol (90 per cent.).

Phloroglucinol and Vanillin Solution: *Synonym.*—Guenzburg's Solution (for the detection of free hydrochloric acid in the stomach): (A) 10 per cent. w/v of phloroglucinol in dehydrated alcohol. (B) 10 per cent. w/v of vanillin in dehydrated alcohol. For use, mix 2 parts by volume of A with 1 part by volume of B.

Phosphomolybdic Acid Solution: (for the determination of blood sugar by Folin and Wu's method): 35 grammes of molybdic acid and 5 grammes of sodium tungstate, $Na_2WO_4,2H_2O$, added to 200 millilitres of 10 per cent. w/v solution of sodium hydroxide diluted with 200 millilitres of water, boiled vigorously for thirty minutes, cooled, diluted to 350 millilitres, mixed with 125 millilitres of phosphoric acid (specific gravity, about 1·75), and water to 500 millilitres. It is used in conjunction with sodium tungstate solution, 2/3 N sulphuric acid, sodio-cupric tartrate solution, and dilutions of a standard 1 per cent. w/v solution of anhydrous dextrose in saturated aqueous benzoic acid solution.

Reagents—*Continued.*

Platinic Chloride Solution: 5 per cent. w/v of platinic chloride, $H_2PtCl_6,6H_2O$, in water.

Potassio-Cupric Tartrate Solution: *Synonym.*—Fehling's Solution: **No. 1.** 34·64 grammes of copper sulphate with 0·5 millilitre of sulphuric acid dissolved in sufficient water to produce 500 millilitres. **No. 2.** 176 grammes of sodium potassium tartrate and 77 grammes of sodium hydroxide, dissolved in sufficient water to produce 500 millilitres. Mix equal volumes of solutions No. 1 and No. 2 immediately before use.

Potassio-Mercuric Iodide Solution: *Synonym.*—Mayer's Reagent: 1·355 grammes of mercuric chloride dissolved in 60 millilitres of water, and 5 grammes of potassium iodide dissolved in 20 millilitres of water, mixed and diluted with water to 100 millilitres.

Potassio-Mercuric Iodide Solution, Alkaline: *Synonym.*—Nessler's Reagent: to 3·5 grammes of potassium iodide and 1·25 grammes of mercuric chloride, dissolved in 80 millilitres of water, add a cold saturated solution of mercuric chloride in water, with constant stirring, until a slight red precipitate remains; add 12 grammes of sodium hydroxide, a little more saturated solution of mercuric chloride and water to produce 100 millilitres; allow to stand, and decant the clear liquid.

For use in chemical pathology the reagent is prepared by the following method:—15 grammes of mercuric iodide dissolved in a solution of 11·25 grammes of potassium iodide in 7·5 millilitres of water, filtered, diluted to 300 millilitres and mixed with 700 millilitres of 10 per cent. w/v sodium hydroxide solution.

Potassium Aluminium Sulphate Solution, M/10: an aqueous solution of potash alum containing in 1000 millilitres 47·44 grammes of $KAl(SO_4)_2,12H_2O$.

Potassium Bromate Solution, N/10: an aqueous solution of potassium bromate containing in 1000 millilitres 2·784 grammes of $KBrO_3$.

Potassium Chromate Solution: 5 per cent. w/v of potassium chromate in water; it gives a red precipitate with silver nitrate in neutral solution.

Potassium Cyanide Solution: 10 per cent. w/v of potassium cyanide in water.

Potassium Dichromate Solution: 7 per cent. w/v of potassium dichromate in water.

Potassium Dichromate Solution, N/10: an aqueous solution of potassium dichromate containing in 1000 millilitres 4·904 grammes of $K_2Cr_2O_7$.

Reagents—*Continued.*

Potassium Ferricyanide Solution: freshly prepared by washing 1 gramme of potassium ferricyanide, in crystals, with a little water and dissolving in 100 millilitres of water; it gives a blue colour with solutions of ferrous salts.

Potassium Ferricyanide Solution, Alkaline (for the determination of blood sugar by Hagedorn and Jensen's method): 1·65 grammes of potassium ferricyanide and 10·6 grammes of anhydrous sodium carbonate in water to 1000 millilitres. It is used in conjunction with iodide-sulphate-chloride solution, N/10 sodium hydroxide, 1·45 per cent. w/v zinc sulphate solution, 1 per cent. w/v solution of soluble starch in saturated sodium chloride solution, and N/200 sodium thiosulphate.

Potassium Ferricyanide Solution, M/10: an aqueous solution of potassium ferricyanide containing in 1000 millilitres 32·92 grammes of $K_3Fe(CN)_6$.

Potassium Ferrocyanide Solution: 5 per cent. w/v of potassium ferrocyanide in water.

Potassium Hydroxide Solution: approximately 5 per cent. w/v of potassium hydroxide in water.

Potassium Hydroxide Solution, Strong: 50 per cent. w/v of potassium hydroxide in water.

Potassium Hydroxide Solution, N/1: an aqueous solution of potassium hydroxide containing in 1000 millilitres 56·10 grammes of KOH.

Potassium Iodate Solution, M/5: an aqueous solution of potassium iodate containing in 1000 millilitres 42·81 grammes of KIO_3.

Potassium Iodide Solution: 10 per cent. w/v of potassium iodide in water.

Potassium Iodide and Starch Solution: 10 per cent. w/v of potassium iodide and 5 per cent. v/v of mucilage of starch in water, freshly prepared.

Potassium Permanganate Solution: 1 per cent. w/v of potassium permanganate in water.

Potassium Permanganate Solution, N/10: an aqueous solution of potassium permanganate containing in 1000 millilitres 3·161 grammes of $KMnO_4$.

Pyrogallol Solution, Alkaline: 0·5 gramme of pyrogallol dissolved in 2 millilitres of water, and 12 grammes of potassium hydroxide in 8 millilitres of water, mixed immediately before use.

Reagents—*Continued.*

Resorcinol Solution, Acid: *Synonym.*—Seliwanoff's Reagent (for the detection of lævulose): 0·1 gramme of resorcinol dissolved in 200 millilitres of a 33 per cent. v/v dilution of hydrochloric acid.

Ruthenium Red Solution: freshly prepared by dissolving 0·008 gramme of ruthenium red (ammoniated ruthenium hydroxychloride) in 10 millilitres of a 10 per cent. w/v solution of lead acetate in water.

Salicylsulphonic Acid Solution (for the detection of protein in urine): a saturated solution of salicylsulphonic acid in water.

Scarlet Red Solution: a mixture of 70 millilitres of alcohol (90 per cent.), 10 millilitres of water and 20 millilitres of a 10 per cent. w/v aqueous solution of potassium hydroxide, saturated with scarlet red.

Silver Nitrate Solution: 5 per cent. w/v of silver nitrate in water.

Silver Nitrate Solution, Alcoholic: 4 grammes of silver nitrate in 10 millilitres of water, with sufficient alcohol (95 per cent.) to produce 100 millilitres.

Silver Nitrate Solution, Ammoniacal: dissolve 2·5 grammes of silver nitrate in about 80 millilitres of water, add nearly sufficient solution of ammonia to dissolve the precipitate first formed, allow to stand, decant, and add sufficient water to produce 100 millilitres.

Silver Nitrate Solution, N/10: an aqueous solution of silver nitrate containing in 1000 millilitres 16·99 grammes of $AgNO_3$.

Soap Solution, Standard: 10 grammes of hard soap dissolved in alcohol (35 per cent.) to 1000 millilitres, the resulting solution being adjusted by the addition of alcohol (35 per cent.) until 13 millilitres is required for the production of a lather permanent for five minutes when shaken with 100 millilitres of water containing in solution neutral calcium chloride equivalent to 0·012 gramme of $CaCO_3$.

Sodio-Bismuth Tartrate Solution, Alkaline: *Synonym.*—Nylander's Reagent (for the detection of reducing substances in urine): 40 grammes of sodium potassium tartrate and 20 grammes of bismuth subnitrate dissolved in 1000 millilitres of 8 per cent. w/v aqueous solution of sodium hydroxide.

Sodio-Cupric Citrate Solution: *Synonym.*—Benedict's Solution—Qualitative: 100 grammes of anhydrous sodium carbonate (or 270 grammes of sodium carbonate) dissolved with the aid of gentle heat in 600 millilitres of water, 173 grammes of sodium citrate added, the solution cooled, a cold solution of 17·3 grammes of copper sulphate in 100 millilitres of water added slowly with constant stirring, and the liquid diluted to 1000 millilitres.

Reagents—*Continued.*

Sodio-Cupric Citro-thiocyanate Solution: *Synonym.*—Benedict's Solution—Quantitative: 18 grammes of copper sulphate dissolved in 100 millilitres of water and poured slowly, with constant stirring, into a cold solution of 200 grammes of sodium carbonate, 200 grammes of sodium citrate and 125 grammes of potassium thiocyanate in water to 800 millilitres; 5 millilitres of 5 per cent. w/v solution of potassium ferrocyanide added and water to 1000 millilitres.

Sodio-Cupric Tartrate Solution: *Synonym.*—Alkaline Copper Tartrate Solution (for the determination of blood sugar by Folin and Wu's method): to 40 grammes of anhydrous sodium carbonate dissolved in 400 millilitres of water add 7·5 grammes of tartaric acid and, when solution is complete, 4·5 grammes of copper sulphate and water to 1000 millilitres. It is used in conjunction with sodium tungstate solution, 2/3 N sulphuric acid, phosphomolybdic acid solution, and dilutions of a standard 1 per cent. w/v solution of anhydrous dextrose in saturated aqueous benzoic acid solution.

Sodium Arsenite Solution, N/100: an aqueous solution of sodium arsenite containing in 1000 millilitres arsenic trioxide equivalent to 0·6495 gramme of $NaAsO_2$.

Sodium Carbonate Solution: 10 per cent. w/v of sodium carbonate in water.

Sodium Carbonate Solution, N/1: an aqueous solution of sodium carbonate containing in 1000 millilitres 53·00 grammes of Na_2CO_3.

Sodium Chloride Solution: *Synonym.*—Brine: a saturated solution of sodium chloride in water.

Sodium Hydroxide Solution: 20 per cent. w/v of sodium hydroxide in water.

Sodium Hydroxide Solution, Dilute: 5 per cent. w/v of sodium hydroxide in water.

Sodium Hydroxide Solution, N/1: an aqueous solution of sodium hydroxide containing in 1000 millilitres 40·00 grammes of NaOH.

Sodium Hypobromite Solution: 10 per cent. v/v of bromine in 40 per cent. w/v aqueous solution of sodium hydroxide. It should be freshly prepared.

Sodium Nitroprusside Solution: a freshly prepared 1 per cent. w/v solution of sodium nitroprusside, $Na_2Fe(CN)_5NO,2H_2O$, in water.

Sodium Nitroprusside Solution: *Synonym.*—Rothera's Solution (for the detection of acetone and acetoacetic acid in urine): a freshly prepared 5 per cent. w/v solution of sodium nitroprusside in water.

Reagents—*Continued.*

Sodium Nitroprusside and Ammonium Sulphate (for Rothera's test for acetone and acetoacetic acid in urine): 100 grammes of powdered ammonium sulphate mixed with 1 gramme of powdered sodium nitroprusside.

Sodium Phosphate Solution: 10 per cent. w/v of sodium phosphate in water.

Sodium Sulphate Solution: 10 per cent. w/v of sodium sulphate in water.

Sodium Sulphate Solution, Acid (for the determination of blood sugar by MacLean's method): 15 grammes of sodium sulphate dissolved in water to 100 millilitres and mixed, when required for use, with 0·1 millilitre of glacial acetic acid.

Sodium Sulphide Solution: 10 per cent. w/v of sodium sulphide in water.

Sodium Thiosulphate Solution, N/10: an aqueous solution of sodium thiosulphate containing in 1000 millilitres 24·82 grammes of $Na_2S_2O_3,5H_2O$.

Sodium Tungstate Solution (for precipitating proteins): 10 per cent. w/v of sodium tungstate, $Na_2WO_4,2H_2O$, in water. It is used in conjunction with 2/3 N sulphuric acid.

Sodium Tungstate with Sodium Acetate Solution: *Synonym.*—Braemer's Reagent: 1 gramme of sodium tungstate and 2 grammes of sodium acetate in 10 millilitres of water.

Stannous Chloride Solution: add 20 grammes of tin to a mixture of 60 millilitres of hydrochloric acid and 20 millilitres of water, heat gently until hydrogen ceases to be evolved and dilute with water to 100 millilitres, leaving any undissolved tin in the solution.

Starch Mucilage: recently prepared by triturating 0·5 gramme of starch, or 2 grammes of soluble starch, with 5 millilitres of water, and adding to sufficient water to produce 100 millilitres, boiling and cooling.

Sudan III Solution: 0·01 gramme of Sudan III in a mixture of 5 millilitres of alcohol (90 per cent.) and 5 millilitres of glycerin.

Sulphomolybdic Acid Solution: 1 per cent. w/v of ammonium molybdate in sulphuric acid.

Sulphovanadic Acid Solution: *Synonym.*—Mandelin's Reagent: freshly prepared by triturating 1 gramme of ammonium vanadate with 100 millilitres of sulphuric acid; the deposit is allowed to subside, and the clear liquid used.

Sulphuric Acid Solution, Dilute: approximately 10 per cent. w/w of H_2SO_4 in water.

Sulphuric Acid Solution, Strong: 2 volumes of sulphuric acid mixed with 1 volume of water.

Reagents—*Continued.*

Sulphuric Acid Solution, N/1: an aqueous dilution of sulphuric acid containing in 1000 millilitres 49·04 grammes of H_2SO_4.

Sulphurous Acid Solution: 6·4 per cent. w/w of sulphurous acid in water (approximately 5 per cent. w/w of SO_2).

Tannic Acid Solution: 10 per cent. w/v of tannic acid in water.

Tartaric Acid Solution: 12·5 grammes of tartaric acid dissolved in 60 millilitres of water, with 25 millilitres of alcohol (90 per cent.) and water to 100 millilitres.

Thymol Blue Solution: 0·1 gramme of thymol blue (thymolsulphonephthalein) warmed with 4·3 millilitres of N/20 sodium hydroxide and 5 millilitres of alcohol (90 per cent.) until dissolved and diluted with alcohol (20 per cent.) to produce 250 millilitres. *p*H range, 1·2 to 2·8, and 8·0 to 9·6. Colour change, red in strongly acid solutions, yellow in weakly acid and weakly alkaline solutions to blue in more strongly alkaline solution.

Titanous Chloride Solution: approximately 15 per cent. w/v of titanous chloride, $TiCl_3$, in water.

Titanous Chloride Solution, N/10: titanous chloride solution diluted with hydrochloric acid and water to contain 15·427 grammes of $TiCl_3$ in 1000 millilitres. To 103 millilitres of titanous chloride solution and 103 millilitres of hydrochloric acid, add recently boiled and cooled water to 1000 millilitres. Standardise immediately before use by titration in an atmosphere of carbon dioxide against N/10 ferric ammonium sulphate, using ammonium thiocyanate as indicator. It should be stored in completely filled bottles or in an atmosphere of hydrogen or carbon dioxide.

Trichloracetic Acid and Ferric Chloride Solution: *Synonym.*—Fouchet's Reagent (for the detection of bilirubin in serum or plasma): 25 grammes of trichloracetic acid dissolved in 100 millilitres of water and mixed with 10 millilitres of a 10 per cent. w/v solution of ferric chloride, $FeCl_3$.

Trinitrophenol Solution: 0·66 per cent.w/v of trinitrophenol in water.

Trinitrophenol and Citric Acid Solution: *Synonym.*—Aufrecht's Reagent (for the determination of protein in urine): 15 grammes of trinitrophenol and 30 grammes of citric acid dissolved in water to 1000 millilitres.

Trinitrophenol and Citric Acid Solution: *Synonym.*—Esbach's Solution (for the determination of protein in urine): 10 grammes of trinitrophenol and 20 grammes of citric acid in water to 1000 millilitres.

Trypsin Broth: 1 pound of minced lean beef is added to 100 millilitres of water and 20 millilitres of N/1 sodium hydroxide solution, allowed to stand over night, and then maintained at 75° to 80° for five minutes. Cool to 37°, add 10 millilitres of 1 per cent. trypsin and maintain at 37° for three hours. Allow to stand over night, siphon off the clear liquid, filter, adjust to *p*H 7·2 and autoclave.

Reagents—*Continued.*

Turmeric Tincture: macerate 10 grammes of bruised turmeric in 60 millilitres of alcohol (90 per cent.) for seven days, and filter.

Uric Acid Solution, Concentrated, Standard: dissolve 0·1 gramme of uric acid in a warm solution of 0·05 gramme of lithium carbonate in 20 millilitres of water, add 5 millilitres of solution of formaldehyde and 1 millilitre of acetic acid (50 per cent.) and dilute to 100 millilitres.

Uric Acid Solution, Standard (for the determination of uric acid in blood): 1 millilitre of concentrated standard uric acid solution diluted with water containing 10 millilitres of 2/3 N sulphuric acid and 1 millilitre of solution of formaldehyde to 250 millilitres.

Water: the distilled water of the British Pharmacopœia.

Water, Ammonia-free: water giving no colour when 2 millilitres of alkaline potassio-mercuric iodide solution is added to 50 millilitres.

Zinc Solution, Ammoniacal: 7·70 grammes of zinc dissolved in about 75 millilitres of dilute hydrochloric acid, an excess of ammonia solution added, and diluted to 1000 millilitres with water.

APPENDIX VII

Quantitative Test for Arsenic

The apparatus, reagents and solutions, and the general method of testing to be used for the quantitative test for arsenic in the substances of the British Pharmaceutical Codex are those of the British Pharmacopœia, 1932. The solution to be examined is prepared by one of the methods described in the British Pharmacopœia or by a method described in the table below, and is tested in a manner corresponding to the quantitative test for arsenic in the substances of the British Pharmacopœia.

The following table gives the method, or the substance in the British Pharmacopœia to which reference must be made for the method, of preparing the solution to be tested, together with the quantity to be taken when the test is used as a limit test in which the stain is not deeper than the 1 millilitre standard stain corresponding to the arsenic limit stated in the monograph.

Substance	Method or reference substance for preparing the solution to be examined	Grammes of substance employed	Limit of arsenic, parts per million
Acidum Glycerophosphoricum ..	Acidum Aceticum ..	4	**2·5**
Acidum Hydriodicum Dilutum ..	Add 50 millilitres of hot water, 0·5 millilitre of solution of bromine AsT., and 10 millilitres of hydrochloric acid AsT.; allow to stand for five minutes, and remove the excess of bromine with a few drops of solution of stannous chloride AsT.	2	**5**
Acidum Sulphurosum	Mix in the cold with 0·5 gramme of potassium chlorate AsT., and 11 millilitres of hydrochloric acid AsT., warm to expel excess of chlorine, then add 50 millilitres of hot water and a few drops of solution of stannous chloride AsT.	2	**5**

Quantitative Test for Arsenic—*Continued.*

Substance	Method or reference substance for preparing the solution to be examined	Grammes of substance employed	Limit of arsenic, parts per million
Aluminii Hydroxidum	Acidum Citricum	0·5	**20**
Aluminii Sulphas	Acidum Citricum	2	**5**
Ammonii Acetas	Acidum Citricum	2	**5**
Ammonii Benzoas	Acidum Acetylsalicylicum	5	**2**
Ammonii Bromidum	Calcii Lactas	2	**5**
Ammonii Citras	Acidum Citricum	5	**2**
Ammonii Hippuras	Acidum Acetylsalicylicum	2	**5**
Ammonii Iodidum	Calcii Lactas	2	**5**
Ammonii Phosphas	Potassii Acetas	2	**5**
Ammonii Salicylas	Acidum Acetylsalicylicum	5	**2**
Ammonii Sulphas	Potassii Acetas	1	**10**
Ammonii Tartras	Acidum Citricum	2	**5**
Antimonii Oxidum	Antimonii et Potassii Tartras	0·01	**1000**
Antimonium Sulphuratum	Dissolve by boiling in a small flask with 0·2 gramme of calcium hydroxide AsT. and 5 millilitres of water, then add 2 millilitres of solution of bromine AsT. and again gently boil, then add 17 millilitres of hydrochloric acid AsT. and 5 millilitres of water and boil until most of the bromine is volatilised, the last traces being removed by adding a slight excess of solution of stannous chloride AsT.; connect to a condenser and distil 20 millilitres, then wash the condenser and flask, return the distillate to the flask, adding	0·01	**1000**

Quantitative Test for Arsenic—*Continued.*

Substance	Method or reference substance for preparing the solution to be examined	Grammes of substance employed	Limit of arsenic, parts per million
	1 drop of solution of stannous chloride AsT., and redistil 16 millilitres, then add to the distillate 45 millilitres of hot water and a few drops of solution of stannous chloride AsT.		
Azorubrum	Methylthioninæ Chloridum	0·3	**30**
Bismuthi Citras ..	Bismuthi Salicylas ..	5	**2**
Bismuthi et Ammonii Citras ..	Bismuthi Salicylas ..	5	**2**
Bismuthi et Sodii Tartras	Bismuthi Salicylas ..	5	**2**
Bismuthi Naphtholas	Bismuthi Salicylas ..	5	**2**
Bismuthi Oxidum ..	Bismuthi Carbonas ..	5	**2**
Bismuthi Subgallas	Bismuthi Salicylas ..	5	**2**
Bismuthi Subnitras	Heat in a porcelain dish with 2 millilitres of sulphuric acid AsT. until white fumes are evolved, cool, add 5 millilitres of water and again heat until white fumes are evolved; dissolve the residue when cold in 20 millilitres of water and 10 millilitres of stannated hydrochloric acid AsT., transfer to a small flask, connect to a condenser and distil 20 millilitres; add to the distillate a little solution of bromine AsT. to oxidise any sulphurous acid, remove excess of bromine by a few drops of solution of stannous chloride AsT., and add 40 millilitres of hot water.	5	**2**

Quantitative Test for Arsenic—*Continued.*

Substance	Method or reference substance for preparing the solution to be examined	Grammes of substance employed	Limit of arsenic, parts per million
Bismuthi Tannas ..	Bismuthi Salicylas ..	5	**2**
Bismuthi Tribromphenas	Bismuthi Salicylas ..	5	**2**
Bromum	Solution of Bromine AsT.	2	**5**
Caffeinæ Hydrobromidum ..	Sodii Benzoas	1	**10**
Calcii Acetylsalicylas	Sodii Benzoas	2	**5**
Calcii Bromidum ..	Acidum Citricum ..	2	**5**
Calcii et Sodii Lactas	Calcii Lactas	2	**5**
Calcii Formas ..	Calcii Lactas	2	**5**
Calcii Glycerophosphas	Potassii Acetas	2	**5**
Calcii Hypophosphis	Mix in the cold with 2 grammes of potassium chlorate and 18 millilitres of hydrochloric acid AsT., allow to stand for one hour, then warm to expel excess of chlorine and add 40 millilitres of hot water and a few drops of solution of stannous chloride AsT.	2	**5**
Calcii Iodidum ..	Calcii Lactas	2	**5**
Calcii Oxidum ..	Magnesii Oxidum Leve ..	2	**5**
Cerii Oxalas ..	Sodii Benzoas	2	**5**
Ferri et Ammonii Citras Viridis ..	Ferri Carbonas Saccharatus	2	**5**
Ferri et Mangani Citras	Ferri Carbonas Saccharatus	2	**5**
Ferri et Potassii Tartras	Ferri Carbonas Saccharatus	2	**5**
Ferri et Strychninæ Citras	Ferri Carbonas Saccharatus	2	**5**
Ferri Glycerophosphas	Ferri Carbonas Saccharatus	2	**5**

Quantitative Test for Arsenic—*Continued.*

Substance	Method or reference substance for preparing the solution to be examined	Grammes of substance employed	Limit of arsenic, parts per million
Ferri Lactas ..	Ferri Carbonas Saccharatus	2	5
Ferri Oxidum Præcipitatum Fuscum	Dissolve in 15 millilitres of hydrochloric acid AsT. and 10 millilitres of water and add solution of stannous chloride AsT. until the yellow colour disappears; connect to a condenser and distil 20 millilitres; to the distillate add a little solution of bromine AsT., remove excess of bromine with a few drops of solution of stannous chloride AsT. and add 40 millilitres of water.	2	5
Ferri Oxidum Præcipitatum Rubrum	Dissolve in 15 millilitres of hydrochloric acid AsT. and 10 millilitres of water and proceed as directed for Ferri Oxidum Præcipitatum Fuscum.	2	5
Ferri Phosphas ..	Ferri Carbonas Saccharatus	2	5
Ferri Phosphas Saccharatus	Ferri Carbonas Saccharatus	2	5
Ferri Quininæ et Strychninæ Citras	Ferri Carbonas Saccharatus	2	5
Ferri Valerianas ..	Ferri Carbonas Saccharatus	2	5
Liquor Ferri Persulphatis	Liquor Ferri Perchloridi	2	5
Lithii Acetylsalicylas	Sodii Benzoas	2	5
Lithii Benzoas ..	Sodii Benzoas	2	5
Lithii Bromidum ..	Calcii Lactas	2	5
Lithii Carbonas ..	Potassii Carbonas ..	2	5
Lithii Chloridum ..	Acidum Citricum ..	2	5

Quantitative Test for Arsenic—*Continued.*

Substance	Method or reference substance for preparing the solution to be examined	Grammes of substance employed	Limit of arsenic, parts per million
Lithii Citras	Acidum Citricum	2	**5**
Lithii Iodidum	Calcii Lactas	2	**5**
Lithii Salicylas	Sodii Benzoas	2	**5**
Magenta	Methylthioninæ Chloridum	1	**10**
Magnesii Chloridum	Acidum Citricum	5	**2**
Magnesii Glycerophosphas	Acidum Citricum	2	**5**
Magnesii Hydroxidum	Magnesii Oxidum Leve	2	**5**
Magnesii Peroxidum	Potassii Carbonas	2	**5**
Magnesii Phosphas	Calcii Lactas	2	**5**
Magnesii Salicylas	Sodii Benzoas	5	**2**
Magnesii Sulphas Exsiccatus	Acidum Citricum	2	**5**
Mangani Glycerophosphas	Acidum Citricum	2	**5**
Mangani Hypophosphis	Mix in the cold with 2 grammes of potassium chlorate and 18 millilitres of hydrochloric acid AsT., allow to stand for one hour, then warm to expel excess of chlorine and add 40 millilitres of hot water and a few drops of solution of stannous chloride AsT.	1	**10**
Methylviola	Methylthioninæ Chloridum	1	**10**
Novaurantia	Methylthioninæ Chloridum	1	**10**
Phenol-Rubrum	Methylthioninæ Chloridum	2	**5**
Potassii Chloridum	Acidum Citricum	10	**1**

Quantitative Test for Arsenic—*Continued.*

Substance	Method or reference substance for preparing the solution to be examined	Grammes of substance employed	Limit of arsenic, parts per million
Potassii Formas ..	Calcii Lactas	2	**5**
Potassii Glycerophosphas Liquidus	Acidum Aceticum ..	4	**2·5**
Potassii Hypophosphis	Mix in the cold with 2 grammes of potassium chlorate and 18 millilitres of hydrochloric acid AsT., allow to stand for one hour, then warm to expel excess of chlorine and add 40 millilitres of hot water and a few drops of solution of stannous chloride AsT.	2	**5**
Potassii Phosphas ..	Acidum Citricum ..	2	**5**
Potassii Phosphas Acidus	Acidum Citricum ..	2	**5**
Potassii Salicylas ..	Sodii Benzoas	5	**2**
Potassii Sulphas ..	Acidum Citricum ..	2	**5**
Potassii Tartras ..	Calcii Lactas	5	**2**
Sodii Acetas	Potassii Acetas	5	**2**
Sodii Chloras ..	Potassii Chloras	5	**2**
Sodii Formas ..	Calcii Lactas	2	**5**
Sodii Glycerophosphas	Acidum Citricum ..	2	**5**
Sodii Glycerophosphas Liquidus ..	Acidum Aceticum ..	4	**2·5**

Quantitative Test for Arsenic—*Continued.*

Substance	Method or reference substance for preparing the solution to be examined	Grammes of substance employed	Limit of arsenic, parts per million
Sodii Hypophosphis	Mix in the cold with 2 grammes of potassium chlorate and 18 millilitres of hydrochloric acid AsT., allow to stand for one hour, then warm to expel excess of chlorine and add 40 millilitres of hot water and a few drops of solution of stannous chloride AsT.	2	5
Sodii Phenolsulphonas	Sodii Benzoas	5	2
Sodii Phosphas Exsiccatus	Acidum Citricum ..	1	10
Sodii Sulphas Exsiccatus	Acidum Citricum ..	2·5	4
Sodii Sulphis ..	Acidum Hypophosphorosum Dilutum	2	5
Sodii Thiosulphas ..	Dissolve in water, add nitric acid AsT., and evaporate cautiously to dryness on a water-bath; dissolve the residue in water and again evaporate to dryness; dissolve the residue in 40 millilitres of water and add 10 millilitres of stannated hydrochloric acid AsT.	2	5
Sodii Valerianas ..	Sodii Benzoas	2	5
Strontii Bromidum	Calcii Lactas	2	5
Strontii Iodidum ..	Calcii Lactas	5	2
Tartrazina	Methylthioninæ Chloridum	2	5
Viola Crystallina ..	Methylthioninæ Chloridum	1	10

Quantitative Test for Arsenic—*Continued.*

Substance	Method or reference substance for preparing the solution to be examined	Grammes of substance employed	Limit of arsenic, parts per million
Viride Malachitum	Methylthioninæ Chloridum	1	**10**
Viride Nitens ..	Methylthioninæ Chloridum	0·4	**25**
Zinci Carbonas ..	Potassii Carbonas ..	1	**10**
Zinci Iodidum ..	Calcii Lactas	2	**5**
Zinci Phenolsulphonas	Sodii Benzoas	2	**5**
Zinci Valerianas ..	Make into a paste in a porcelain dish with 2 grammes of calcium hydroxide AsT. and 5 millilitres of water, dry and gently ignite; dissolve the residue in 18 millilitres of brominated hydrochloric acid AsT. and 40 millilitres of hot water, and remove excess of bromine by a few drops of solution of stannous chloride AsT.	2	**5**

APPENDIX VIII

Quantitative Test for Lead

The apparatus, reagents and solutions, and the general method of testing to be used for the quantitative test for lead in the substances of the British Pharmaceutical Codex are those of the British Pharmacopœia. Any special tests and directions needed are indicated below and are to be applied in a manner corresponding to the quantitative test for lead in the substances of the British Pharmacopœia.

The following table gives the quantities to be used in the primary and auxiliary solutions, together with the quantities of acetic acid PbT. required and the quantities of the dilute solution of lead PbT. corresponding to the lead limits stated in the monographs.

Substance	Primary Solution		Auxiliary Solution		Millilitres of dilute solution of lead PbT. employed	Limit of lead, parts per million
	Grammes of substance employed	Millilitres of acetic acid PbT.	Grammes of substance employed	Millilitres of acetic acid PbT.		
Acidum Glycerophosphoricum	7	5	2	5	5	**10**
Acidum Hydriodicum Dilutum	7	—	2	—	5	**10**
Acidum Sulphurosum	12	—	2	—	10	**10**
Aluminii Sulphas ..	3[d]	—	1[d]	—	4	**20**
Ammonii Acetas ..	7	—	2	—	5	**10**
Ammonii Benzoas ..	7[a]	15	2[a]	7	5	**10**
Ammonii Bromidum	7	5	2	5	5	**10**
Ammonii Citras ..	7	5	2	5	5	**10**
Ammonii Hippuras ..	3[a]	8	1[a]	6	4	**20**
Ammonii Iodidum ..	7	5	2	5	5	**10**
Ammonii Phosphas ..	7	5	2	5	5	**10**
Ammonii Salicylas ..	7[a]	15	2[a]	7	5	**10**
Ammonii Sulphas ..	7	5	2	5	10	**20**
Ammonii Tartras ..	7	5	2	5	10	**20**
Antimonii Oxidum ..	0·033[e]	—	—	—	5	**1500**
Azorubrum	1[c]	—	—	—	5	**50**
Caffeinæ Hydrobromidum	3[f]	5	1[f]	5	2	**10**

Quantitative Test for Lead—*Continued.*

Substance	Primary Solution		Auxiliary Solution		Millilitres of dilute solution of lead PbT employed	Limit of lead, parts per million
	Grammes of substance employed	Millilitres of acetic acid PbT	Grammes of substance employed	Millilitres of acetic acid PbT.		
Calcii Acetylsalicylas	3	10	1	7	2	**10**
Calcii Bromidum	7	5	2	5	10	**20**
Calcii et Sodii Lactas	3	5	1	2	2	**10**
Calcii Formas	7	5	2	5	5	**10**
Calcii Glycerophosphas	1[b]	—	—	—	2	**20**
Calcii Hypophosphis	3	5	1	5	2	**10**
Calcii Iodidum	3	5	1	5	4	**20**
Calcii Oxidum	3	25	1	10	2	**10**
Ferri et Ammonii Citras Viridis	2[g]	—	—	—	10	**50**
Ferri et Mangani Citras	2[g]	—	—	—	10	**50**
Ferri et Potassii Tartras	2[g]	—	—	—	10	**50**
Ferri Glycerophosphas	2[g]	—	—	—	10	**50**
Ferri Perchloridum	2[g]	—	—	—	10	**50**
Liquor Calcii Hydroxidi Saccharatus	24	—	4	—	4	**2**
Liquor Ferri Perchloridi Fortis	2[g]	—	—	—	10	**50**
Lithii Acetylsalicylas	3[a]	10	1[a]	7	2	**10**
Lithii Benzoas	7[a]	15	2[a]	7	5	**10**
Lithii Bromidum	7	5	2	5	5	**10**
Lithii Carbonas	7	25	2	10	5	**10**
Lithii Chloridum	7	5	2	5	5	**10**
Lithii Citras	7	5	2	5	5	**10**
Lithii Iodidum	7	5	2	5	5	**10**
Lithii Salicylas	7	15	2	7	5	**10**
Magenta	1[c]	—	—	—	5	**50**
Magnesii Chloridum	7	5	2	5	2·5	**5**

Quantitative Test for Lead—*Continued.*

Substance	Primary Solution		Auxiliary Solution		Millilitres of dilute solution of lead PbT employed	Limit of lead, parts per million
	Grammes of substance employed	Millilitres of acetic acid PbT	Grammes of substance employed	Millilitres of acetic acid PbT		
Magnesii Glycerophosphas	1[b]	—	—	—	2	**20**
Magnesii Hydroxidum	3	25	1	10	4	**20**
Magnesii Peroxidum	3	30	1	12	4	**20**
Magnesii Phosphas	1[b]	—	—	—	2·5	**25**
Magnesii Salicylas	7[a]	12	2[a]	7	5	**10**
Magnesii Sulphas Exsiccatus	7	5	2	5	5	**10**
Mangani Glycerophosphas	1[h]	—	—	—	2	**20**
Mangani Hypophosphis	1[h]	—	—	—	2	**20**
Novaurantia	1[c]	—	—	—	5	**50**
Potassii Chloridum	7	5	2	5	2·5	**5**
Potassii Formas	7	5	2	5	5	**10**
Potassii Glycerophosphas Liquidus	7	5	2	5	5	**10**
Potassii Guaiacolsulphonas	7	5	2	5	10	**20**
Potassii Hypophosphis	7	5	2	5	5	**10**
Potassii Phosphas	7	5	2	5	5	**10**
Potassii Phosphas Acidus	7	5	2	5	2 5	**5**
Potassii Salicylas	7[a]	12	2[a]	7	5	**10**
Potassii Sulphas	7	5	2	5	10	**20**
Potassii Tartras	7	5	2	5	10	**20**
Sodii Acetas	12	5	2	5	10	**10**
Sodii Chloras	7	5	2	5	5	**10**
Sodii Formas	7	5	2	5	5	**10**
Sodii Glycerophosphas	7	5	2	5	10	**20**
Sodii Glycerophosphas Liquidus	7	5	2	5	5	**10**

Quantitative Test for Lead—*Continued.*

Substance	Primary Solution		Auxiliary Solution		Millilitres of dilute solution of lead PbT. employed	Limit of lead, parts per million
	Grammes of substance employed	Millilitres of acetic acid PbT.	Grammes of substance employed	Millilitres of acetic acid PbT.		
Sodii Hypophosphis ..	7	5	2	5	5	**10**
Sodii Phenolsulphonas	7	5	2	5	5	**10**
Sodii Phosphas Exsiccatus	7	5	2	5	5	**10**
Sodii Sulphas Exsiccatus	7	5	2	5	5	**10**
Sodii Thiosulphas ..	7	—	2	—	10	**20**
Sodii Valerianas ..	7	—	2	—	5	**10**
Strontii Bromidum ..	7	5	2	5	10	**20**
Strontii Iodidum ..	7	5	2	5	10	**20**
Tartrazina	1 *c*	—	—	—	5	**50**
Viride Nitens	1 *c*	—	—	—	10	**100**

Notes

a. Solution effected by the addition of solution of ammonia PbT.

b. Primary solution prepared by dissolving 1 gramme in 10 millilitres of dilute hydrochloric acid PbT. and adding 25 millilitres of solution of ammonium citrate PbT. Auxiliary solution, 25 millilitres of solution of ammonium citrate PbT.

c. Primary solution prepared as follows:—Heat 1 gramme with 5 millilitres of water and 5 millilitres of nitric acid PbT. in a round-bottomed flask until the first reaction has subsided, cool, add 2·5 millilitres of sulphuric acid PbT. and heat until the mixture begins to darken, then add drop by drop, while still heating, 3 millilitres, or a sufficient quantity, of nitric acid PbT. and continue the heating until white fumes are given off and the liquid is almost colourless. Cool, dilute with 5 millilitres of water and evaporate until white fumes are again given off. Cool, dilute with 100 millilitres of water and dissolve 2 grammes of citric acid PbT. in the liquid, then make alkaline with solution of ammonia PbT. and add 1 millilitre of solution of potassium cyanide PbT. Transfer to a separator, add 10 millilitres of solution of diphenylthiocarbazone PbT. and shake vigorously. Allow the liquids to separate and run off the lower layer. Repeat the extraction

Quantitative Test for Lead—*Continued.*

with two further quantities of 5 millilitres of solution of diphenylthiocarbazone PbT. Wash each solution with the same 10 millilitres of water contained in a second separator. Evaporate the mixed solutions to dryness, add 0·5 millilitre of sulphuric acid PbT. to the residue and heat until white fumes are given off, then add, drop by drop, 0·5 millilitre of nitric acid PbT. and continue the heating until white fumes are again given off and the liquid is almost colourless. Cool, dilute with 35 millilitres of water, add 5 millilitres of acetic acid PbT., 10 millilitres of solution of ammonia PbT. and 1 millilitre of solution of potassium cyanide PbT.

Auxiliary solution prepared by mixing 5 millilitres of acetic acid PbT. with 30 millilitres of water, 10 millilitres of solution of ammonia PbT. and 1 millilitre of solution of potassium cyanide PbT.

d. Primary solution prepared by dissolving 3 grammes in 18 millilitres of 33 per cent. w/v potassium hydroxide solution PbT. Auxiliary solution prepared by dissolving 1 gramme in 6 millilitres of the same solution.

e. Primary solution prepared by dissolving 0·033 gramme in a boiling solution of 1 gramme of potassium acid tartrate in 30 millilitres of water and adding 5 millilitres of solution of sodium hydroxide PbT. Auxiliary solution, 1 gramme of potassium acid tartrate in 30 millilitres of water with 5 millilitres of solution of sodium hydroxide PbT.

f. Filter off any caffeine that may be precipitated on the addition of solution of ammonia PbT.

g. Primary solution prepared as follows:—Dissolve 2 grammes in 20 millilitres of hydrochloric acid PbT., and add 0·5 millilitre of nitric acid PbT. Boil for one minute, cool and pour into a separator. Extract the iron with 20, 20 and 20 millilitres of ether. If the acid liquid is still more than faintly yellow, make an additional extraction with 20 millilitres of ether. Reject the ether extracts. Pour the acid solution into a narrow-necked flask, rinsing the separator with about 5 millilitres of water. Heat gently to volatilise the dissolved ether, make alkaline with solution of ammonia PbT., add 1 millilitre of solution of potassium cyanide PbT. and adjust the volume to 50 millilitres with water.

h. Primary solution prepared by dissolving 1 gramme in 20 millilitres of water, adding 2 millilitres of acetic acid PbT., 2 grammes of ammonium chloride PbT. and 1 millilitre of potassium cyanide solution PbT., making strongly alkaline with dilute ammonia PbT., adjusting the volume to 35 millilitres, and adding 15 millilitres of water containing one drop of sodium sulphide solution PbT. Auxiliary solution prepared in the same way, omitting the manganese salt.

APPENDIX IX

The Determination of Foreign Organic Matter

The following process is applicable to the determination of foreign organic matter in powdered vegetable drugs when the foreign organic matter possesses some definite microscopical character which differs from the characters of the drug itself, and is at the same time sufficiently well marked to be easily recognised. Amongst such substances may be distinguished two distinct types of material which require slightly different treatment, although the basic principle is the same in both instances.

1. The first class of substances includes those which consist wholly of, or contain, characteristic minute particles of well-defined shape and size, such as starch granules and pollen grains.

The method is as follows:—

First reduce the material to a No. 85 powder and determine the loss in weight of the powder when dried at 100°. Mix thoroughly 0·1 gramme of the air-dry powder with 0·05 gramme of lycopodium spores on a glass plate with the aid of a small flexible spatula, holding a second glass plate to screen the powder from being blown away by breathing. Rub the mixture into a smooth paste with a few drops of suspending fluid, such as a mixture of two volumes of glycerin, one volume of mucilage of tragacanth and two volumes of water, or, in the case of oily powders, olive oil or castor oil. Transfer the suspension to a small corked tube, rub the residue on the plate with a further quantity of the suspending fluid, transfer it to the tube and repeat the process until none of the powder remains on the plate. Add sufficient of the suspending fluid to produce a liquid of which one drop, when mounted and examined with the 4 millimetre objective, shows from 10 to 20 lycopodium spores in each field; in most cases this result will be obtained when the total volume is about 10 millilitres. Shake the corked tube gently for about three minutes to ensure uniform distribution of the particles without the introduction of air-bubbles. By means of a dry glass tube of small bore (about 2 to 3 millimetres), transfer one drop of the suspension to a microscope slide; stir the drop with a thin glass rod or a needle, spread it over an area a little less than that of the cover glass to be used, then apply the cover glass gently and quickly. Leave the slide on a level place so as to allow the particles to settle evenly. Count the characteristic particles of the adulterant and the spores present in the same 25 fields selected according to the scheme illustrated in the figure. Make another count in a second mount. Prepare another suspension and repeat the whole operation. From the mean of the four results, which should not differ by more than 10 per cent. for the two suspensions, calculate the number of the particles present in one gramme of the powder under examination, dried at 100°. The number of the characteristic particles per gramme of the pure adulterant, calculated on the pure adulterant dried at 100°, is then either determined experimentally or found by

The Determination of Foreign Organic Matter—*Continued.*

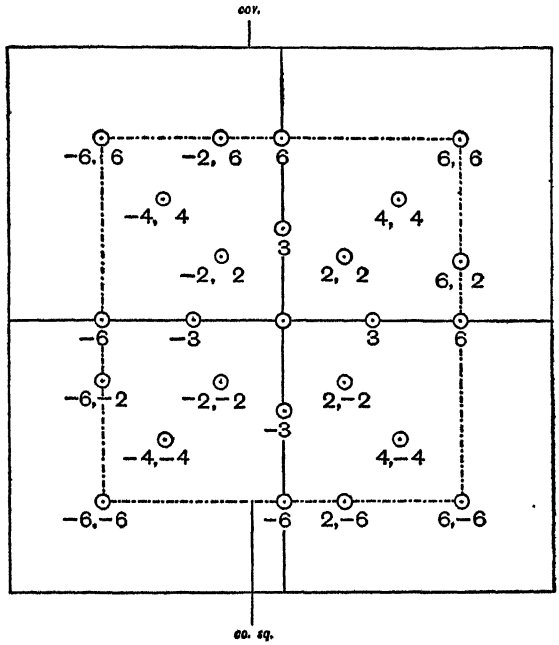


FIG. 1.—Diagram showing the position of the 25 fields selected for counting the spores and tracing the particles: *cov.* edge of cover-glass; *co. sq.* counting square. The numbers indicate the distance in millimetres of the position of the field from the centre of the cover-glass.

reference to the literature. The percentage of adulterant is calculated according to the following formula:—

$$\text{Percentage of adulterant} = \frac{n \times w \times 94000 \times 100}{s \times m \times p}$$

where:—

n = number of characteristic particles of adulterant in 25 fields.
s = number of spores in the same 25 fields.
w = weight in milligrams of the lycopodium taken.
m = weight in grammes of the sample, calculated on the sample dried at 100°.
94000 = number of spores per milligram of lycopodium.
p = number of characteristic particles per gramme of the pure adulterant, calculated on the pure adulterant dried at 100°.

NOTE.—When the moisture in the air-dry powder is evenly distributed, the percentage of air-dry adulterant in the air-dry powder is identical with that calculated by the formula given above

The Determination of Foreign Organic Matter—*Continued.*

2. The second class of substances includes those which possess:—

(a) A tissue composed of easily recognisable cells which form a characteristic layer that is only one cell in thickness, e.g. epidermal tissues and such tissues as the sclerenchymatous layer of linseed.

(b) Characteristic cells which occur singly or in single files, e.g. the bast fibres of cinnamon and of cinchona.

For powders of this type the general method of procedure is similar to that described above, but it is usually necessary to use, in addition to the suspending medium, a clearing or staining reagent and, instead of counting the particles, to determine their area.

For clearing a powder having a characteristic epidermis, the powder and lycopodium are placed in a tube with 3 to 3·5 millilitres of solution of chloral hydrate, and the tube is heated by immersion in boiling water, with occasional shaking, for about five minutes or until the particles are almost colourless. Cool, and add the required amount of suspending fluid, consisting of two volumes of glycerin, one volume of mucilage of tragacanth and two volumes of water.

For staining lignified particles, rub the mixture of lycopodium and powder into a paste with 1 millilitre of solution of phloroglucinol, allow it to evaporate almost to dryness and add 1 millilitre of strong hydrochloric acid, mix thoroughly, and incorporate a few drops of glycerin, transfer to the corked tube and add the suspending fluid, to which, if necessary, a clearing agent such as 1 millilitre of solution of chloral hydrate is added. Make a mount as described above and, by means of a camera lucida, trace the outline of the characteristic particles at a definite magnification, such as 400 diameters, and count the spores present in the same 25 fields. Determine the total area of the tracings by cutting the paper along the outlines of the tracings, weighing the pieces so cut out, and multiplying by the area of one gramme of the paper used.

In a similar way determine the total area of characteristic particles present in 1 gramme of the pure adulterant, calculated on the pure adulterant dried at 100°, or a standard figure may be obtained from the literature. Calculate the percentage of adulterant from the following formula:—

$$\text{Percentage of adulterant} = \frac{f \times w \times 94000 \times 100}{400^2 \times s \times m \times a}$$

where:—

f = area of characteristic particles in 25 fields at a magnification of 400 diameters.

s = number of spores in 25 fields.

w = weight in milligrams of the lycopodium taken.

m = weight in grammes of the sample, calculated on the sample dried at 100°.

94000 = number of spores per milligram of lycopodium.

a = area of characteristic particles per gramme of the pure adulterant, calculated on the pure adulterant dried at 100°.

The Determination of Foreign Organic Matter—*Continued.*

NOTE.—When foreign organic matter is present in small proportion, such as 2 per cent., a larger area of the mounts must be used for counting or tracing the particles. In such cases, an area of about 40 square millimetres is sufficient and is obtained by counting nine strips across the counting square and spaced at 1·5 millimetres apart, each strip having a width equal to the diameter of the field of view of the microscope. For other proportions of adulterant, the area selected would lie between that of 25 fields and 40 square millimetres, and can easily be adjusted by the worker so as to give concordant results.

APPENDIX X

Hydrogen Ion Concentration

Substances in solution differ widely in the amount ionised at similar dilutions; thus, the hydrogen chloride in N/10 hydrochloric acid is almost completely dissociated into hydrogen and chlorine ions, whereas acetic acid in similar concentration is only slightly dissociated. Hence, although both these solutions contain the same amount of hydrogen replaceable by metals, they differ largely in active acidity; hydrochloric acid is said to be a "strong" acid, and acetic acid a "weak" acid. Ions carry electrical charges; the hydrogen ion carries unit positive charge and the chlorine ion carries unit negative charge. Hence solutions of strongly ionised substances will offer little resistance to the passage of an electric current, and the smaller the degree of ionisation the greater will be the resistance of the solution. Owing to this relationship between the degree of ionisation and electrical resistance, the percentage of a substance ionised in solution can be obtained by measuring the resistance of the solution.

By the application of this principle, water is found to be little ionised and the concentration of hydrogen ion works out to be approximately 0 0000001 gramme per litre, or in terms of normality, N/10,000,000.

$$H_2O \rightleftharpoons H^{\cdot} + OH';$$

From the above relationship it is obvious that the concentration of hydroxyl ion must be exactly equivalent to that of the hydrogen ion, and pure water must be exactly neutral. The equilibrium expressed in the above equation is governed by the law of mass action and the condition at equilibrium is given by the following formula, where K is the dissociation constant for water:—

$$\frac{[H^{\cdot}]\ [OH']}{[H_2O]} = K.$$

In all solutions in which water is the solvent, this equilibrium between un-ionised water and its ions must exist, and such solutions are exactly neutral when the concentration of hydrogen ion is 0·0000001 gramme per litre, acid in reaction when the concentration of hydrogen ion is greater, and alkaline when less than this figure. No reference need be made to the concentration of hydroxyl ion, since it automatically adjusts itself in order to preserve the relationship expressed above. Thus, the term hydrogen ion concentration can be used as a quantitative expression to denote both acidity and alkalinity, and offers the advantage of making it possible to avoid the use of indefinite phrases, such as "strongly acid" and "faintly acid." The disadvantage lies in the awkwardness of the numbers concerned; to say that the hydrogen ion concentration is 0·0000001 gramme per litre is too cumbrous for general adoption, but the common logarithm of this number is — 7·0. Thus

Hydrogen Ion Concentration—*Continued.*

the term *p*H is defined as "the common logarithm of the *reciprocal* of the concentration of hydrogen ion expressed in grammes per litre." That is, $p\text{H} = \log. \frac{1}{[\text{H}^\cdot]}$. On applying this formula to the above example, $p\text{H} = \log. \frac{1}{[\text{H}^\cdot]} = \log. \frac{1}{0{\cdot}0000001} = \log. \ 10{,}000{,}000 = 7{\cdot}0$.

Hence *p*H 7 is the quantitative expression for absolute neutrality. If the hydrogen ion concentrations of 0·000001 and 0·00000001 gramme per litre be similarly converted into *p*H, the former becomes *p*H 6 and expresses a hydrogen ion concentration greater than *p*H 7, and the latter becomes *p*H 8 and expresses a concentration less than *p*H 7. Values less than *p*H 7 therefore indicate increasing acidity, and those greater than *p*H 7 indicate increasing alkalinity or decreasing acidity. The limiting values are from about *p*H — 0·3, occurring in 6N hydrochloric acid, to about *p*H 14·5, representing 7N potassium hydroxide.

Owing to the use of this logarithmic method of expression, a change of one unit in the *p*H represents a ten-fold change in the hydrogen ion concentration; reference to the diagram on page 1599 shows that *p*H 1 represents a hydrogen ion concentration of 0·1 gramme per litre, *p*H 2 represents 0 01 gramme per litre, *p*H 3, 0 001 gramme per litre, and so on. Intermediate values are expressed as decimals of a *p*H unit, and thus 0·1 of a unit represents approximately a 20·5 per cent. alteration in the hydrogen ion concentration. Also, the difference between *p*H 7 and *p*H 6 is equivalent to 0·0000009 gramme of hydrogen ion per litre (or to 0 009 millilitre of N/10 hydrochloric acid); the difference between *p*H 2 and *p*H 1 is equivalent to 0·09 gramme of hydrogen ion per litre (or to 900 millilitres of N/10 hydrochloric acid). Hence, a difference of one unit of *p*H has a greatly different meaning in terms of acidity according to the distance from the neutral point.

Colorimetric Determination of *p*H Values

Indicators are compounds which exist in two forms, the pseudo form being incapable of ionisation and the inogenic form being capable of complete dissociation, the ions produced being coloured differently from the un-ionised form. This change is brought about by a variation in the *p*H of the solution. Different indicators change colour over different ranges of *p*H, and for each indicator a range of *p*H can be given which expresses the limiting values at which no dissociation and complete dissociation respectively occur. At each of these limiting *p*H values the full depth of each of the colours is observed, whilst at intermediate values the whole of the intermediate shades are traversed. Thus, methyl orange exhibits a full red colour in solution of *p*H 2·8 and under, a full yellow colour at *p*H 4 and over, but between *p*H 2 8 and *p*H 4 intermediate shades of orange are observed. It is important to realise that the further the range of the indicator is from *p*H 7 the greater the

Hydrogen Ion Concentration—*Continued.*

amount of hydrogen ion this range represents. Thus, 20 millilitres of solution just yellow to methyl red requires the equivalent of 0·01 millilitre of N/10 hydrochloric acid to turn red, whereas 20 millilitres of solution just yellow to thymol blue requires the equivalent of 12 millilitres of N/10 hydrochloric acid to turn red. Hence, only those indicators with the same range of *p*H are interchangeable.

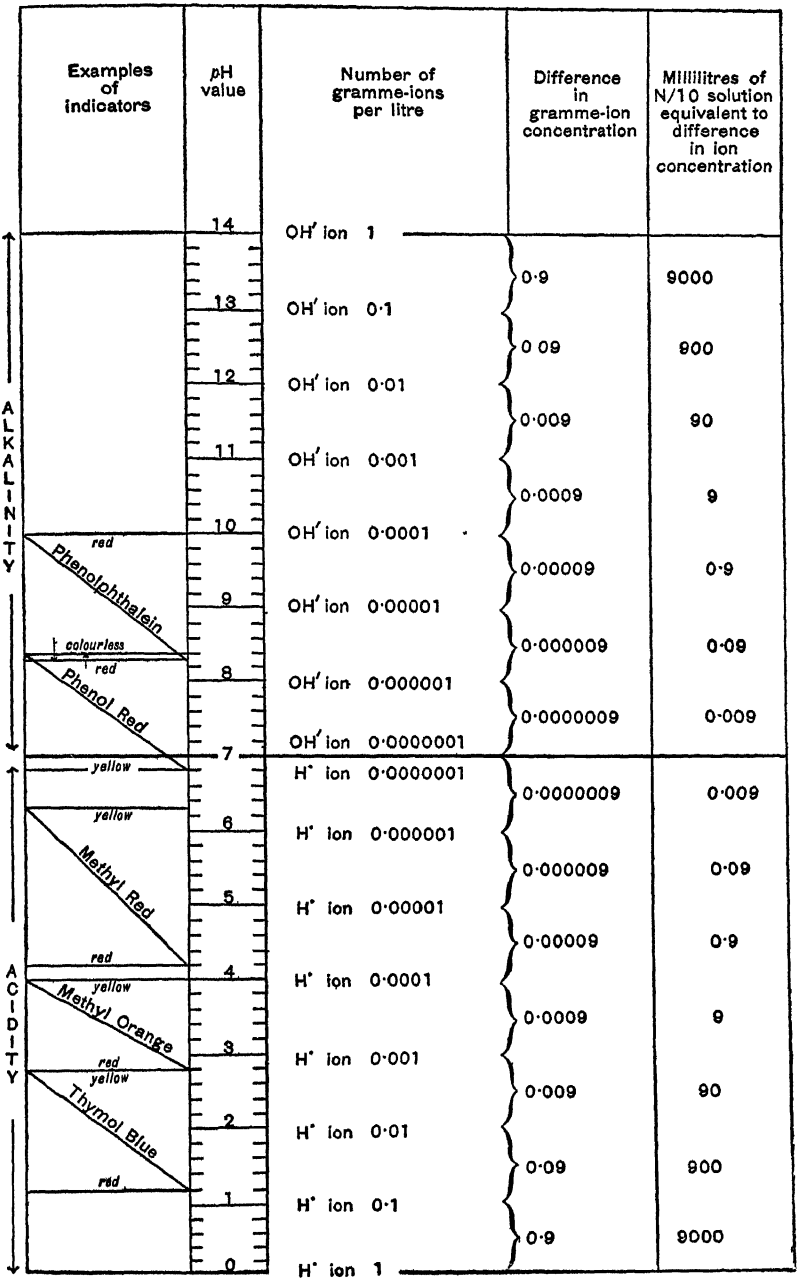
A series of indicators of varying ranges can be used for the determination of *p*H values, but, to secure accuracy, solutions of standard *p*H must be used for comparison. Methyl red in a solution of *p*H 4·2 is red, in a solution of *p*H 6·3 is yellow, and intermediately gives different shades of orange. If solutions were made of *p*H 4·4, *p*H 4·6, *p*H 4·8, *p*H 5·0, *p*H 5·2, *p*H 5·4, *p*H 5·6, *p*H 5·8, *p*H 6·0, and *p*H 6·2, all containing the same quantity of methyl red, they could be used to match the tint of an unknown solution which contained the same quantity of the same indicator. The *p*H of dilute solutions of strong acids and strong bases is very sensitive to the smallest trace of impurity such as carbon dioxide, dust from the air, or alkali from the vessels. Hence, for solutions of standard *p*H, so-called "Buffer Solutions" are used, which show very little change in *p*H on dilution or on the addition of small quantities of strong acids or strong bases; in other words, they are fairly stable with respect to *p*H, and the carbon dioxide always present in water does not affect them. Such buffer solutions usually consist of solutions of a salt which is hydrolysed in water, such as the salt of a strong base and a weak acid, with one of the products of hydrolysis. The conditions obtaining in a solution of sodium acetate and acetic acid are represented by the following equations:—

(a) $CH_3 \cdot COONa \rightleftharpoons Na^{\cdot} + CH_3 \cdot COO'$
(strongly ionised)

(b) $CH_3 \cdot COOH \rightleftharpoons H^{\cdot} + CH_3 \cdot COO'$
(slightly ionised)

On the addition of a little hydrochloric acid to such a system, part of the hydrogen ions would be utilised in combining with the abundance of acetate ions to form un-ionised acetic acid; addition of potassium hydroxide would result in the formation of un-ionised water through combination of the hydroxyl ions with hydrogen ions. In both cases the active ions are to a large extent removed from the sphere of the reaction by these ionic reactions, and hence the change in the *p*H of the solution is much less than when the same amount of hydrochloric acid or potassium hydroxide is added to a solution not buffered.

The colorimetric determination of the *p*H of a solution consists in comparing the colour with that of suitable buffer solutions after the addition of the same quantity of an indicator. If the test solution is itself slightly coloured, a compensation can be made by viewing the buffer solutions through a simple solution of the substance under examination of the same concentration as that used in the test solution.


Examples of indicators
pH value
Number of gramme-ions per litre
Difference in gramme-ion concentration
Millilitres of N/10 solution equivalent to difference in ion concentration
ALKALINITY
ACIDITY
Phenolphthalein
red
colourless
Phenol Red
red
yellow
Methyl Red
yellow
red
Methyl Orange
yellow
red
Thymol Blue
yellow
red
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
OH' ion 1
OH' ion 0·1
OH' ion 0·01
OH' ion 0·001
OH' ion 0·0001
OH' ion 0·00001
OH' ion 0·000001
OH' ion 0·0000001
H· ion 0·0000001
H· ion 0·000001
H· ion 0·00001
H· ion 0·0001
H· ion 0·001
H· ion 0·01
H· ion 0·1
H· ion 1
0·9
0·09
0·009
0·0009
0·00009
0·000009
0·0000009
0·0000009
0·000009
0·00009
0·0009
0·009
0·09
0·9
9000
900
90
9
0·9
0·09
0·009
0·009
0·09
0·9
9
90
900
9000

Hydrogen Ion Concentration—*Continued.*

The method of procedure for this determination and the quantities of the different reagents required for the preparation of solutions of standard *p*H are included in an appendix to the British Pharmacopœia.

When a higher degree of accuracy in the determination of *p*H values is required, an electrical method is used. The method is unaffected by the colour of the liquid, but the apparatus required is somewhat complicated. When an element is placed in a solution of its ions, there is a tendency for the atoms to pass into solution in the form of ions, and this is balanced by the tendency of the ions to pass out of solution. The latter tendency is called the solution pressure, or osmotic pressure of the ions. The difference between the two opposing forces makes itself manifest in the form of electro-motive force. Hydrogen at a pressure of one atmosphere in a normal solution of hydrogen ion develops an E.M.F. of −0·27 volt, and the corresponding value for the calomel electrode is −0·56 volt. Hence the primary cell, formed by the combination of the hydrogen electrode and the calomel electrode, develops a voltage equal to the algebraic difference between them: −0·27−(−0·56) = +0·29 volt when the hydrogen ion concentration is normal or, in other words, at *p*H 0.. A ten-fold change in the osmotic pressure of the solution is equivalent to 0·058 volt when the ion is univalent, but this is equal to a change of 1 in the *p*H of the solution, and E.M.F. $=0{\cdot}29+0{\cdot}058\times p\text{H}$; or,

$$p\text{H} = \frac{\text{E.M.F.} - 0{\cdot}29}{0{\cdot}058}.$$

Hence, the E.M.F. is directly proportional to the *p*H and not to the hydrogen ion concentration of the solution. The electrometric method depends, therefore, upon the measurement of the potential difference between the hydrogen electrode, immersed in the test solution, and a standard calomel electrode.

APPENDIX XI

Colloidal Solutions

A very large number of substances can be dispersed, by suitable means, in liquids in which they are generally considered to be insoluble, so that the products resemble true solutions in appearance, but differ in many other properties. These solutions have low osmotic pressures, and when they are dialysed, the dispersed substance does not pass through the membrane. In this respect they resemble solutions of those substances, such as glue and gelatin, to which the name colloid was originally restricted, and they are, therefore, known as colloidal solutions or "sols." In the majority of sols of pharmaceutical interest the liquid medium is water, the principal exceptions being found in the collodions and certain emulsions. The following description applies principally to aqueous sols.

The fact that a substance in colloidal solution does not pass through a parchment membrane is due to the larger size of the particles. In true solutions the particles are of molecular dimensions, the size being of the order of 0·1 $\mu\mu$ (10^{-7} millimetre). The particles of dispersed substance in a colloidal solution consist of aggregates of a large number of molecules and, in general, colloidal phenomena are shown by liquids in which the dispersed particles vary in size between about 1 $\mu\mu$ and 100 $\mu\mu$. The properties of liquids containing smaller particles approximate more closely to those of true solutions, while liquids containing larger particles resemble ordinary suspensions; there is, however, no clear distinction between the three classes, and solutions of substances of high molecular weight and suspensions of finely divided solids both show colloidal properties.

Colloidal particles are too small to be rendered visible by the ordinary microscope, but by means of the ultra-microscope Brownian movement can be observed. The fact that the particles in a colloidal solution do not separate out of the liquid is due partly to this movement, and partly to the electrical charge they carry. In some sols this charge is positive, but in the majority it is negative; in either case, the mutual repulsion of similarly charged particles tends to keep them in suspension.

It will be noted that there are two main types of colloidal solutions. Some substances, such as gelatin, acacia and agar, disperse spontaneously in water to form aqueous sols, while others, such as sulphur, ferric hydroxide and iodine, form sols only under certain conditions. These are known respectively as lyophilic and lyophobic colloids. Another respect in which these two types differ from one another is in their viscosity. Colloids having well defined lyophobic properties give sols of about the same viscosity as that of the liquid medium alone; these sols consist undoubtedly of solid particles suspended in a liquid, and are therefore known as suspensoid sols. Lyophilic colloids form sols in which it is probable that the dispersed particles contain in

Colloidal Solutions—*Continued.*

association a large number of molecules of the liquid, and they are much more viscous than the dispersion medium. In this respect they resemble emulsions, which are dispersions of liquids in liquids, and they are therefore known as emulsoid sols. Both systems of classification approximately correspond, but there is a gradual transition in character from the typically lyophilic or emulsoid sols to the typically lyophobic or suspensoid sols.

The majority of emulsoid sols differ from suspensoid sols in leaving on evaporation a residue which can be redispersed in water to reproduce the sol; the sols of this type are said to be "reversible." They also differ in showing a tendency to gelatinise, forming a "gel." The principal difference between the two types is, however, in their behaviour towards electrolytes. On the addition of an electrolyte, a suspensoid sol becomes unstable owing to neutralisation of the charge on the particles, and the dispersed substance is precipitated. Coagulation of a negatively charged sol is brought about mainly by the positive ion of the electrolyte and vice versa. The higher the valency of the active ion the smaller is the concentration of electrolyte required to produce coagulation. Thus, in the case of negatively charged suspensoid sols, aluminium salts are more active precipitants than calcium salts, and the latter are, in turn, more active than sodium salts. The hydrogen ion (acids) is, however, more potent than other univalent cations, and organic ions, such as those of alkaloids, are also active in comparatively low concentrations. Similarly, sulphates cause coagulation of a positively charged sol, such as solution of dialysed iron, in lower concentration than chlorides. Emulsoid sols are not readily precipitated by the addition of electrolytes. Their greater stability is connected with the presence of associated water molecules in the particles and, on the removal of the associated water by the addition of dehydrating agents such as alcohol or acetone, the particles are readily precipitated by electrolytes.

Comparatively high concentrations of very soluble salts are also able to coagulate or "salt-out" emulsoid sols, even in the absence of a dehydrating agent. According to modern theories of solution, the ions of a very soluble substance are associated with a large number of solvent molecules. Hence, on the addition of excess of a soluble salt to an emulsoid sol, the ions remove water molecules associated with the colloidal particles, thus having a dehydrating effect similar to that of alcohol, and the usual coagulating action of an electrolyte is then effective. Different ions show this dehydrating effect to different extents. The order of activity of different anions is independent of the cation and is the same for all sols. The most effective are citrates, tartrates and sulphates; iodides and thiocyanates have no "salting-out" effect, but have rather the reverse action. The most commonly used salts are the sulphates of ammonium, sodium and magnesium; ammonium sulphate is the most soluble of these, and is used for precipitating proteins in the preparations of biological products such as sera.

Colloidal Solutions—*Continued.*

Many emulsoid sols are stable in the presence both of acids and of alkalis. The sign of the charge varies with the *p*H of the medium; usually in acid solution the particles are positively charged and in alkaline solution negatively charged. At some intermediate point, usually not at *p*H 7, the particles are uncharged; at this point the sol exhibits its greatest instability and the disperse phase is most readily precipitated by electrolytes. The point of zero charge is known as the iso-electric point and is defined by the *p*H of the medium. This instability when the particles are uncharged is used, for example, in the preparation of insulin, which is precipitated between the limits corresponding to the values *p*H 5 and *p*H 6.

The charge on the particles in a colloidal solution can be neutralised by mixing oppositely charged sols. When the ratio of the volumes mixed is kept within limits, both sols may be completely coagulated; if either sol is present in large excess a stable mixed sol results, in which all the particles have a charge of the same sign as that of the colloid present in excess. Mixtures of suspensoid and emulsoid sols have largely the properties of the emulsoid type, particularly their stability in the presence of electrolytes. The coagulation of a suspensoid sol by an electrolyte can, therefore, be largely prevented by the addition of an emulsoid sol, which is said to "protect" it. The protective value of a sol, termed the "gold number," is estimated by determining the amount required to prevent coagulation of a gold sol on the addition of a given quantity of sodium chloride solution. The values obtained with a gold sol do not necessarily apply to other sols, but, in general, gelatin and isinglass are more effective than acacia, although both gelatin and acacia are commonly used in pharmaceutical preparations. The most effective protective colloids as yet obtained are decomposition products of proteins, such as gelatin or egg albumen. They are particularly useful for stabilising sols of metals, but cannot be used in medicinal sols administered by injection owing to the protein content.

Although the usual effect of the addition of an electrolyte to a suspensoid sol is to cause coagulation, some substances, especially finely divided precipitates, will disperse only in a solution of an electrolyte, forming a stable colloidal solution. The process is known as peptisation, and is utilised in pharmacy in making preparations such as solution of ferric oxychloride, which contains ferric hydroxide peptised by ferric chloride. Colloidal solutions prepared by peptisation are unstable in the presence of other electrolytes, and are coagulated if the peptising agent is removed by dialysis.

Methods of Preparing Colloidal Solutions

Many substances, particularly those giving emulsoid sols, disperse spontaneously in appropriate solvents. Gelatin, agar, starch and hæmoglobin are common examples of these, and readily disperse in water to form colloidal solutions. In general, these substances are all

Colloidal Solutions—*Continued.*

complex organic compounds of high molecular weight, and their colloidal nature may possibly be due to the large size of the molecule, which approaches the dimensions of typical colloidal particles. Colloidal solutions of substances which do not normally occur as colloids may be prepared by two general types of process. Ordinary gross particles may be reduced in size by mechanical means, or molecules may be made to coagulate to a limited extent to form aggregates of colloidal dimensions. The former method is applied in the apparatus known as a "colloid mill," in which a suspension of the substance required in the colloidal condition is passed between two discs rotating at high speed in opposite directions. This process may be used, for example, in the preparation of the very finely divided colloidal varieties of substances such as kaolin or calamine. The colloidal particles in a kaolin suspension may be separated without coagulating by adding an electrolyte such as sodium silicate and exposing it to an electric field. In these circumstances the silicate ions become associated with the particles of kaolin, imparting a negative charge, and the particles move to the positive electrode where they are deposited. Another example of the mechanical reduction of the size of gross particles is found in the electro-dispersion processes for preparing colloidal solutions. The original method, that of Bredig, consisted in passing an electric arc beneath the surface of water between two electrodes of the substance required in colloidal solution. Numerous modifications of this method have been introduced by means of which it is possible to prepare sols of practically any metal and of many non-metals. The addition of a protective colloid is necessary to ensure stability. The preparation of colloidal solutions by allowing molecules to coalesce usually involves chemical interaction in the presence of a large volume of liquid and of a protective colloid. The details, therefore, vary with individual substances and are considered in certain cases below.

Therapeutic Properties of Colloidal Solutions

The therapeutic value of substances in colloidal solution has been the subject of much controversy. Their use in medicine is based on the fact that the smaller size of colloidal particles, in comparison with finely powdered substances, confers on them a greater surface area and therefore a greater activity. For example, the action of sulphur depends largely upon its conversion into sulphide; this takes place most readily with colloidal sulphur and least with the crystalline variety. Colloidal kaolin also shows stronger adsorptive properties than the same substance in gross particles, owing to the larger surface area. It is also possible that, since the body tissues and vital functions are almost entirely of a colloidal nature, they are therefore more likely to respond to treatment with colloidal substances. On the other hand, it has been suggested that colloidal solutions administered by the mouth must be coagulated by contact with the digestive fluids and any special value of the colloidal

Colloidal Solutions—*Continued.*

condition thereby lost. It is the more difficult to assess accurately the medicinal value of a substance in colloidal solution because in some of the preparations on the market the active ingredient is not in colloidal solution, but in chemical combination with a body of colloidal nature. In the case of a number of colloidal liquids administered by injection, the therapeutic effect may be due largely to the protective colloid, which is commonly of proteid nature, the action being the same as that of substances administered in non-specific protein therapy. It is, however, probable that a number of substances in the colloidal state do possess definite therapeutic properties, and possess advantages over the same substances in the ionic or molecular condition. Practically nothing is known of their fate when introduced into the body, but it is not improbable that, although precipitated, they form a reservoir from which is liberated a small but continuous supply of the ionised substance.

Colloidal Antimony Sulphide. A colloidal solution of antimony sulphide may be prepared by saturating a dilute solution of potassium antimonyltartrate with hydrogen sulphide, removing electrolytes by dialysis, and protecting the sol thus obtained with acacia. It has been administered by injection in the treatment of various tropical diseases, but possesses no demonstrable superiority over potassium antimonyltartrate in ordinary solution.

Colloidal Calcium. Preparations of calcium in colloidal solution do not contain the metal itself in colloidal suspension, but consist of an aqueous solution of the calcium salt of an acid, such as oleic acid or glutaminic acid which is obtained by the hydrolysis of gelatin. It is sometimes administered by the mouth or by injection in the treatment of cases of calcium deficiency.

Colloidal Gold. An aqueous gold sol may be prepared by electrodispersion methods, and stabilised with gelatin or isinglass. It may be prepared more conveniently by the chemical reduction of gold chloride in very dilute solution with formaldehyde. A gold sol is used in the examination of the cerebrospinal fluid as an aid to the diagnosis of certain pathological conditions. This test, known as the Lange reaction, consists in determining the effect of the cerebrospinal fluid in protecting the gold sol from the precipitating action of sodium chloride. In certain diseases of the central nervous system the protective activity is greatly reduced.

Colloidal Iodine. Iodine in colloidal form is stated to be produced when simple solution of iodine is added to milk. A solution of colloidal iodine may be prepared by adding solutions of iodine and of hydriodic acid to water containing acacia or gelatin. In some preparations the iodine is in combination with organic matter of colloidal nature. Colloidal iodine is administered internally in the treatment of rheumatoid arthritis and chronic rheumatism.

Colloidal Solutions—*Continued.*

Colloidal Iron. In colloidal solutions containing iron, the metal is frequently present as the hydroxide. Solution of dialysed iron is a ferric hydroxide sol. On account of the absence of ferric ions, this and other similar preparations are free from astringency.

Colloidal Lead, and Colloidal Lead Selenide. A colloidal solution of lead may be obtained by electrical methods and in other ways. Lead selenide is precipitated on mixing aqueous solutions of an alkali selenide and a soluble lead salt. When the precipitation is carried out in the presence of acacia, a small proportion of the precipitate remains in colloidal solution from which electrolytes may be removed by dialysis. Colloidal lead, either as the metal or in combination, has been tried in the treatment of cancer. Its use was suggested by the abortifacient action of lead, which appears to be due to its toxic action on the chorionic villi. Since it was believed that the cells of the chorionic villi have certain resemblances in growth to malignant cells, it was argued that this action of lead would be inimicable to cancer cells. Investigations of many lead-containing substances, such as colloidal lead, colloidal lead phosphate, and colloidal lead selenide, have indicated that the formation of ionic lead must be prevented if toxic effects are to be avoided. The preparation is administered intravenously; the total dosage which should be given is from 0·5 to 0·8 gramme of metallic lead. Liver and kidney functions should be examined carefully before lead is administered, and during treatment, since it is on these organs that the brunt of the toxic action of the metal falls. Cases exhibiting a failing heart muscle or a severe degree of anæmia are obviously unsuitable for lead therapy. Lead treatment may be combined with X-ray or radium therapy, though some observers have called attention to the danger of combining treatment by a selenium-lead compound with exposure to radium. No satisfactory chemotherapeutic measure has yet been discovered for the treatment of cancer, although it is possible to some extent to inhibit the growth of certain malignant tumours by means of colloidal lead.

Colloidal Manganese. A colloidal solution of manganese hydroxide may be obtained by mixing solutions of manganese chloride and sodium hydroxide in the presence of dextrose. It has been administered by injection in the treatment of boils and other staphylococcal infections.

Colloidal Silver. A colloidal solution of silver may be prepared by electro-dispersion methods, and stabilised by gelatin or an alkaline solution of egg albumen. A 1 per cent. colloidal silver solution may also be prepared by reducing silver nitrate with a solution of ferrous sulphate and sodium citrate, or by adding ammonia solution gradually to silver nitrate solution until the precipitate first formed is just re-dissolved, and reducing the product with tannic acid, formaldehyde, or hydrogen; a protective colloid must be added. Colloidal silver is used in a strength of 1 in 2000 as a non-irritant antiseptic in the treatment

Colloidal Solutions—*Continued.*

of infections of mucous membranes. Some colloidal preparations of silver contain the metal in combination with compounds obtained by the degradation of proteins; such, for example, are silver proteinate and mild silver proteinate.

Colloidal Sulphur. A colloidal sulphur solution may be obtained by adding sulphuric acid to a solution of sodium thiosulphate in the presence of gelatin or acacia. It is used internally in the treatment of rheumatic affections. Externally, colloidal sulphur has been used for the treatment of various skin diseases.

APPENDIX XII

Sterilisation

Solutions and suspensions for injection or for application to mucous membranes, such as the conjunctiva, should be sterile, that is, free from living micro-organisms. The methods used to kill or remove the micro-organisms may involve the application of dry or moist heat, the use of chemical substances, filtration, or a combination of these methods. The method chosen must be one which does not inactivate the medicament or render the preparation unsuitable for the particular purpose for which it is intended.

Temperature has a very marked effect on bacterial development; in the case of pathogenic bacteria, the optimum temperature for their growth is about 37°, but growth may occur at much lower and at slightly higher temperatures than this. The minimum temperature which is fatal to an organism is known as the thermal death point (T.D.P.). For non-sporing bacteria and for the vegetative forms of sporing bacteria it is considerably lower than for spores, and is lower in the presence of moisture than in its absence. In the latter condition the spore capsules are not hydrated and therefore, when the temperature is raised, they do not swell, rupture and permit escape and destruction of the protoplasm. Whilst the T.D.P. may vary with the different types of bacteria, no non-sporing forms can survive a temperature of 80° when maintained for thirty minutes. In steam under pressure, a temperature of 115° to 116° maintained for thirty minutes is fatal to all spore forms, but in the dry condition 150° for one hour is necessary. The T.D.P. may be lowered by the presence of an antiseptic such as phenol. When sterile preparations for injection are dispensed in bulk in such a manner as to permit the withdrawal of several doses, an antiseptic, such as 0·5 per cent. w/v of phenol, is added so that, should re-infection occur, the development of the bacteria will be inhibited.

Sterilisation by heat is generally the most suitable and convenient method, but it can only be applied if the medicament is thermostable. When the substance is not thermostable, filtration is usually adopted, but the preparations must then be submitted subsequently to the tests for sterility before being used for injection.

The preparation of sterile solutions and material necessitates the adoption of rigid *aseptic methods* which involve as far as possible the exclusion of bacteria from the product prior to the final sterilising operation. Such precautions greatly facilitate sterilisation and sometimes constitute the only method that can be adopted. Sterile solvents and containers should always be used. The dispenser should observe precautions of personal cleanliness, such as the wearing of a clean overall and disinfection of the hands by washing in an antiseptic solution, etc. The operations should be carried out in a room which is

Sterilisation—*Continued.*

as dust-free as possible and which is not subject to air-currents. All glass apparatus should be well cleaned in hot soapy water or, if new, with a mixture of sulphuric acid, 46 parts by volume, potassium dichromate, 6 parts, and water, 46 parts, and subsequently well washed with distilled water.

Chemicals which can replace phenol as antiseptics include chlorbutol and cresol, in a minimum concentration of 1 in 200. The presence of sodium chloride is considered to increase the potency of phenol and cresol as antiseptics, and low temperature sterilisation, that is between 70° and 100°, of an injection containing phenol probably produces a sterile preparation with greater certainty than when an antiseptic is absent from the solution. Phenol may reduce the efficiency of tyndallisation since it prevents the development of spores into vegetative bacteria.

Methods of Sterilisation

Heating in an Autoclave.—Whenever possible, solutions to be sterilised should be heated in steam under pressure. This can be carried out efficiently by means of an autoclave. A temperature of 115° to 116° for thirty minutes, which involves a pressure of 10 pounds per square inch in excess of atmospheric pressure when the autoclave is filled with steam, is sufficient to kill all bacteria and spores. This method may be used for sterilising apparatus and aqueous solutions of substances which are not damaged at the temperatures stated. Care must be taken to ensure that all air is removed from the autoclave by blowing steam through before finally closing it down. Bottles containing solutions to be sterilised in the autoclave should have well-fitting stoppers, or the stopper may be replaced by a plug of non-absorbent cotton wool covered with transparent cellulose tissue or with a small glass dish. The stoppers, if sterilised separately, should be replaced aseptically.

Where the volume of the liquid to be sterilised exceeds 100 millilitres, more than thirty minutes is necessary in order to ensure that the whole of the solution has been maintained at 115° to 116° for thirty minutes. At the expiration of the time, the source of heat should be removed and the pressure allowed to fall to normal before opening the autoclave. When two or more containers holding different solutions are autoclaved together, each container should be marked so as to ensure its recognition after removal from the autoclave. Solutions supplied in bottles with rubber caps are sterilised by heating the solution in the plugged bottles for the specified time, allowing the temperature to fall to 100°, removing the bottles and placing the sterilised cap over the necks. The rubber caps may be sterilised by boiling for thirty minutes in a sterilised 2 per cent. solution of phenol and stored in the solution in which they have been boiled.

The following table shows the temperatures corresponding to various pressures of steam:—

Sterilisation—*Continued.*

Pressure of Steam in excess of Atmospheric Pressure	Corresponding Temperatures	
	Centigrade	Fahrenheit
5 lb. per sq. inch	109°	228°
10 lb. per sq. inch	115 5°	240°
15 lb. per sq. inch	121°	250°
20 lb. per sq. inch	126°	259°
25 lb. per sq. inch	130 5°	267°
30 lb. per sq. inch	134 5°	274°

Dry Heat.—Sterilisation by means of dry heat is carried out in a hot air oven, the temperature of which is controlled by a thermostat or by adjustment of the source of heat. Apparatus, etc., subjected to dry heat requires a higher temperature for efficient sterilisation than when moisture is present. Small pieces of apparatus, ampoules and vials should either be wrapped in paper or placed in lightly covered tins, before they are subjected to the action of heat. Flasks, test tubes, measures and bottles should be plugged with non-absorbent cotton wool, covered not too tightly with paper or transparent cellulose tissue, the covering being tied in position. Heat should be applied gradually to the oven, and sterility is ensured by maintaining a temperature of 150° for one hour. Care must be taken not to open the door of the hot air oven while the temperature inside is still high.

This method of sterilisation may be used for fixed oils, glycerin, liquid, hard and soft paraffins, waxes, and powders, such as kaolin, purified talc and zinc oxide, which should be spread out in thin layers. In the preparation of a solution or a suspension which would undergo a chemical or physical change at 150°, the vehicle should first be sterilised in the hot air oven, and the solution or suspension made by aseptic methods, with the addition of phenol or other antiseptic. If thermostable, the finished product should be sterilised by tyndallisation or by heating at 100° for thirty minutes unless it contains sufficient antiseptic to maintain it in a sterile condition.

Tyndallisation.—Tyndallisation, or the intermittent heating of preparations at temperatures between 60° and 80°, is a method of sterilisation which depends for its result on the killing of bacteria in the vegetative form during the first heating, and the inducement of spores to germinate, rendering them susceptible to the action of heat on subsequent days. The process of tyndallisation of the British Pharmacopœia requires the material to be heated at 80° for one hour on three successive days and, unless otherwise stated, this temperature is maintained in the sterilisation by tyndallisation of substances of the British Pharmaceutical Codex. The material to be sterilised must be in sealed containers, ampoules, or bottles, and the most convenient

Sterilisation—*Continued.*

form of apparatus consists of a water-bath fitted with a gas or electric regulator so that the desired temperature may be maintained. It is convenient to add a small quantity of dye, such as methylene blue, to the water in the bath as an indicator of leakage between the product being sterilised and the water. Any leakage will be shown on allowing the container to cool, without removing it from the bath, by the entry of some of the coloured water. In the case of large volumes of material, for example, bottles containing more than 100 millilitres, heating may be necessary for a period longer than one hour in order to maintain the contents at that temperature for the specified period.

In the process of tyndallisation, absolute sterility can only be obtained if relatively clean material is used in making the preparation; the greatest care is therefore necessary in sterilising the apparatus and the medium used in making the product. It has been shown that tyndallisation is not reliable unless controlled by subsequent tests for sterility.

Filtration.—Sterilisation by filtration consists in passing the material to be sterilised through filters made of fine, unglazed porcelain (Chamberland or Doulton), or of diatomite (Berkefeld), or pads of compressed asbestos (Seitz). The selected bacteria-proof filter is first sterilised by heating in an autoclave at 115° to 116° for thirty minutes, or in a steam steriliser for one hour on three successive days. When required for use it is attached to a filter flask which has been sterilised in the manner described for the filter, the steam having been admitted to the flask through an air filter, and is connected to a suction pump, all the joints being completely air-tight. On the completion of sterilisation, the filtrate is distributed aseptically into sterile ampoules which are then sealed, or into sterile rubber-capped bottles. All materials sterilised by filtration must comply with tests for sterility before being used. If an asbestos pad filter is used, a small quantity of sterilised water should first be passed through it so as to remove any adherent particles and any soluble matter which may be present. The pad is subsequently dried by suction. After use, the filter, if of the diatomite or porcelain type, should be cleaned carefully by scrubbing and then passing through it an antiseptic solution such as a 0·5 per cent. solution of potassium permanganate followed by a 5 per cent. solution of sodium pyrosulphite; the candle should then be washed with distilled water and sterilised in the ordinary way before further use.

Emergency Method.—When possible, preparations for injection should be sterilised by heating in an autoclave, by tyndallisation, by filtration, or by heating at 150° for one hour. In an emergency, preparations may be made as follows:—All the apparatus used is sterilised by heating in an autoclave or by heating at 150° for one hour and should be kept ready for use. If the solvent is distilled water, it is sterilised by heating in an autoclave or by boiling for thirty minutes, or if a fixed

Sterilisation—*Continued.*

oil, by heating at 150° for one hour. The injection is prepared and 0·5 per cent. w/v of phenol or other equally effective antiseptic is added, and the previously sterilised final containers are then filled and sealed. The containers are immersed in water which is heated to 80° and kept at that temperature for thirty minutes. If the solution is thermostable at 100°, the containers may be kept in boiling water for thirty minutes. Solutions prepared in this manner are labelled to show the date and the warning, "Keep in a cool place and use within four days." If the solutions are required for intravenous injection, no antiseptic is added, and after the solution has been prepared by aseptic methods it is boiled for fifteen minutes. The emergency method is applicable to those substances which may be sterilised by heating in an autoclave or by tyndallisation, but cannot be used for substances for which the method of filtration alone is recommended. Solutions for intrathecal injection must not be prepared by the emergency method. In any emergency in which the methods described above cannot be applied, it is the duty of the dispenser to inform the prescriber that complete sterilisation cannot be attempted, and to obtain the prescriber's approval for the method to be adopted.

Steaming.—Steaming consists of exposing the aqueous solution to steam at atmospheric pressure in a steamer similar to a Koch's steriliser for a period of one hour after the solution has attained the temperature of the steam. This method has been shown to produce sterile products with aqueous solutions of the following substances:—atropine sulphate, caffeine and sodium benzoate, calcium chloride, codeine phosphate, dextrose, morphine hydrochloride, morphine tartrate, peptone, phenazone, pilocarpine nitrate, procaine hydrochloride, sodium chloride, sodium salicylate, sodium thiosulphate, soluble barbitone, strychnine hydrochloride.

Sterilisation of Dressings

The sterilisation of surgical dressings may be effected by heating them in steam, in apparatus and under conditions similar to those outlined below. The sterilising apparatus consists of three essential parts, namely: (1) a cylindrical sterilising chamber constructed to withstand steam pressure; (2) a steam jacket surrounding this chamber, also constructed to withstand steam pressure; (3) a drying or heating chamber with direct connection to the jacket and consequently subject to the same steam pressure, containing a set of coils through which steam is introduced into the sterilising chambers. An air extractor is also provided, usually of a steam-operated type, capable of maintaining a vacuum for the purpose of extracting air or steam from the sterilising chamber, and suitable gauges are provided to denote the pressures and vacuum in the chamber and jacket. The process of sterilisation consists in exposing the dressings to saturated steam under pressure, and afterwards to hot air, and takes place in the sterilising chamber, which

Sterilisation—*Continued.*

has two doors, one for use in charging with dressings and the other for withdrawal after the process. Steam is first admitted to the jacket until a suitable pressure is reached. The dressings are then placed in the inner chamber, the doors are closed, and air is extracted until an efficient vacuum is obtained, at which point the extractor is closed. Steam is drawn from the drying or heating chamber, passed through a reducing valve for the purpose of reducing it to a pressure lower than that in the drying chamber, then passed through the coils in the latter, where it is heated sufficiently to remove any condensate, and then into the sterilising chamber until the desired pressure is reached and maintained for a sufficient length of time. The steam is then blown off to atmospheric pressure, extracted by vacuum and finally air is drawn by means of the extractor through the sterilising chamber after first having been heated to a suitable temperature by passing through the coils in the heating chamber. This effectively dries the dressings, completing the operation.

The exact steam pressures, degrees of vacuum and process times depend on the nature of the dressings. Small, loosely packed dressings, for example, six-yard rolls of gauze, are found to be sterilised efficiently by thirty minutes' treatment at 10 pounds steam pressure (116°) in the sterilising chamber, the pressure in the jacket being 15 pounds (120°), the vacuum 10 inches and the air heated to 120°, the air drying process continuing for fifteen minutes. Larger or more tightly packed dressings require modification of the above directions, such as longer process times and higher pressures. In order to ensure that the temperature required has been reached during the process of sterilisation, an indicator consisting of a dye, such as methylene blue, in the proportion of 0·1 per cent. of another substance melting at the required temperature, may be inserted in a tube placed in the centre of the dressing. The following substances may be used:—sulphur (melting-point, 115°); acetanilide (melting-point, 113°); terpin hydrate (melting-point, 116°); benzoic acid (melting-point, 121°).

Surgical dressings cannot be sterilised by dry heat, nor are chemical methods suitable for ensuring the absolute sterility of such substances as cotton wool, lint, gauze, etc. Surgical ligature (e.g. catgut) and surgical suture (e.g. horse-hair) are sterilised by boiling under a reflux condenser in alcohol, benzene, or acetone, or by treatment with chromium sulphate and mercuric chloride. Before being issued for use every batch of surgical ligature and suture must comply with tests for sterility.

Rubber gloves, tubing and apparatus are sterilised by boiling with water, or by heating in steam at a temperature of 109° for one hour. Surgical instruments, such as surgeon's knives, forceps, hypodermic syringes and needles, are kept in a sterile condition by storage in solution of cresol with soap (2 per cent. v/v in distilled water) or in alcohol (95 per cent.). Before use they should be washed with sterilised water or with a dilute antiseptic. After use they may be sterilised by

Sterilisation—*Continued.*

heating in boiling water to which is added borax, 1 per cent., or sodium carbonate, 2 per cent.

Tests for Sterility

Solutions for injection which have been sterilised by filtration are tested for sterility by the inoculation and subsequent incubation of tubes of sterile broth. The broth should contain 1 per cent. of peptone and its reaction must lie between *p*H 7·2 and *p*H 7·8.

Not less than 0·1 per cent. of the total volume of the solution to be tested is taken where the volume is not more than 10 litres. If the volume is 10 litres or more, then not less than 10 millilitres is used. When samples are taken from bulk containers, these proportions should be taken from each of the containers and tested separately. When samples are taken from ampoules, not less than 1 per cent. of the total, if the batch does not exceed 1000, and not less than 10 containers, if the total number is more than 1000, are used to inoculate the broth. The tubes of broth are incubated at 37° for five days, one half of the total volume of the sample being used for the aerobic and one half for the anaerobic test. If, at the end of five days, no growth of micro-organisms is visible, the solution may be used for injection. When a growth is visible, further samples are taken and the tests repeated, and if necessary, at the end of a further five days the test is again repeated. If the same organism is visible in more than one test, the batch is regarded as not sterile, and the material is not issued until it has been re-sterilised and has passed the tests.

APPENDIX XIII

Pharmacological Index

A list of the more important drugs, classified in accordance with their pharmacological action or their use for a specific effect in certain diseases.

Preparations of the drugs, except in special cases, are not included; they may be ascertained conveniently from the summary at the end of each monograph.

Absorbents.—Substances used for the absorption of irritating secretions or for the adsorption of gaseous products or toxins in the alimentary canal.

External (Protective).—
Amylum; Bismuthi Subchloridum; Talcum Purificatum; Zinci Oxidum.

Internal.—Toxins:
Carbo; Creta; Kaolinum.

Gaseous Products:
Carbo.

Alkaloidal poisons:
Carbo; Kaolinum.

Anæsthetics.

General.—Substances producing loss of sensation and of consciousness by their depressant effect on the cerebral and spinal centres.
Æther Anæstheticus; Æthylenum; Æthylis Chloridum; Chloroformum; Nitrogenii Monoxidum; Tribromethyl Alcohol.

Local.—Substances which destroy the sense of pain by preventing the conduction of impulses by nerves.
Æthylis Bromidum; Æthylis Chloridum; Amydricainæ Hydrochloridum; Amylocainæ Hydrochloridum; Benzaminæ Hydrochloridum; Benzaminæ Lactas; Benzocaina; Cocaina; Orthocaina; Procainæ Hydrochloridum; Quininæ et Ureæ Hydrochloridum.

Spinal.—Substances which, when injected into the spinal fluid, produce anæsthesia of the lower limbs or of part of the trunk by a local action on posterior roots or spinal cord.
Amylocainæ Hydrochloridum; Procainæ Hydrochloridum.

Surface.—Substances which produce anæsthesia when applied to mucous surfaces.
Cocaina (and its salts).

Analgesics or Anodynes.—Substances which relieve pain, either by direct action on the brain, or on nerve endings.

Pharmacological Index—*Continued.*

General.—Substances which relieve pain by their action on the sensory area of the cerebral cortex.
Acetanilidum; Acidum Acetylsalicylicum; Amidopyrina; Calcii Acetylsalicylas; Colchicina; Hyoscinæ Hydrobromidum; Lithii Acetylsalicylas; Lithii Salicylas; Methylacetanilidum; Morphina; Opium; Papaveretum; Phenacetinum; Phenazoni Salicylas; Phenazonum; Quininæ Acetylsalicylas; Quininæ Salicylas; Salicinum; Sodii Salicylas.

Local.—Substances which relieve superficial pain by their depressant effect on sensory nerve endings.
Aconiti Folium; Aconitina; Aconitum; Belladonnæ Radix; Benzaminæ Hydrochloridum; Benzaminæ Lactas; Camphora; Chloralis Hydras; Chlorbutol; Eugenol; Menthol; Methylis Salicylas; Oleum Caryophylli; Orthocaina; Phenol. (See also Local Anæsthetics.)

Anaphrodisiacs.—Substances which lessen sexual desire.
Acidum Hydrobromicum Dilutum (and bromides); Belladonnæ Folium; Belladonnæ Radix; Camphora; Conii Folium; Conii Fructus; Hyoscinæ Hydrobromidum; Hyoscyaminæ Hydrobromidum; Hyoscyamus; Stramonium.

Anhidrotics.—Substances which diminish profuse perspiration.

Local.—Acidum Aceticum Dilutum; Alcohol; Alumen; Aluminii Acetas; Aluminii Chloridum; Chromii Trioxidum; Liquor Formaldehydi; Trinitrophenol; Zinci Oxidum.

Internal.—Acidum Agaricum; Acidum Camphoricum; Atropina; Belladonnæ Folium; Belladonnæ Radix; Hyoscyamus; Picrotoxinum; Stramonium; Zinci Oxidum.

Antacids.—Substances which reduce excessive acidity of the gastric secretions and maintain the alkali reserve of the blood.

Diminish the acidity of the gastric contents.—Aluminii Hydroxidum; Bismuthi Carbonas; Bismuthi Hydroxidum; Calcii Carbonas; Calcii Hydroxidum; Calcii Phosphas; Creta; Magnesii Carbonas Levis; Magnesii Carbonas Ponderosus; Magnesii Hydroxidum; Magnesii Oxidum Leve; Magnesii Oxidum Ponderosum; Magnesii Phosphas; Potassii Bicarbonas; Sodii Bicarbonas.

Increase the alkalinity of the blood.—Dextrosum; Potassii Acetas; Potassii Citras; Sodii Acetas; Sodii Citras; Sodii et Potassii Tartras.

Anthelmintics.—Substances which destroy worms (vermicides) or cause their expulsion (vermifuges).

Hook-worm.—Betanaphthol; Carbonei Tetrachloridum; Oleum Chenopodii; Tetrachlorethylenum; Thymol.

Pharmacological Index—*Continued.*

Round-worm.—Buteæ Semen; Carbonei Tetrachloridum; Cucurbita; Hexyl-resorcinol; Hydrargyri Subchloridum; Naphthaleni Tetrachloridum; Naphthalenum; Oleum Chenopodii; Oleum Terebinthinæ; Santoninum; Spigelia; Tetrachlorethylenum.

Tape-worm.—Areca; Cucurbita; Cusso; Extractum Filicis; Granati Radicis Cortex; Kamala; Naphthaleni Tetrachloridum; Naphthalenum; Oleum Terebinthinæ; Pelletierinæ Tannas.

Thread-worm.—

Cathartic.—Hydrargyri Subchloridum; Magnesii Sulphas; Oleum Ricini; Sodii Sulphas.

Rectal irrigation.—Acidum Tannicum; Alumen; Calcii Hydroxidum; Ferri Sulphas; Oleum Terebinthinæ; Quassia; Quininæ Bisulphas; Sodii Chloridum.

Internal.—Calcii Permanganas; Carbonei Tetrachloridum; Ferri Sulphas; Oleum Chenopodii; Santoninum; Sulphur; Thymol.

Antipyretics.—Substances which reduce the temperature in fever by their action on the heat-regulating centre.

Acetanilidum; Acidum Acetylsalicylicum; Amidopyrina; Calcii Acetylsalicylas; Cinchona; Lithii Acetylsalicylas; Phenacetinum; Phenazonum; Quinina; Quininæ Acetylsalicylas; Quininæ Disalicylosalicylas; Salicinum; Sodii Salicylas.

Antiseptics and Disinfectants.—Substances which inhibit the growth of, or destroy, micro-organisms.

For general use.

Solid.—Calcii Oxidum; Calx Chlorinata; Naphthalenum.

In solution (for utensils, excreta, bedding, etc.).—
Hydrargyri Perchloridum; Liquor Cresolis Saponatus; Phenol; Zinci Chloridum.

Gaseous (for sick rooms, etc.).—
Chlorine; Cresol (vapour); Paraformaldehydum (vapourised); Phenol; Sulphur (ignited); Sulphur Dioxide.

For local application.

To sterilise the skin before operation.—
Acriflavina; Alcohol; Hexyl-resorcinol; Hydrargyri et Potassii Iodidum; Hydrargyri Oxycyanidum; Hydrargyri Perchloridum; Iodum; Liquor Cresolis Saponatus; Mercurochromum; Methylviola; Phenol; Trinitrophenol; Viride Nitens.

Pharmacological Index—*Continued.*

For skin diseases.—
Acidum Boricum; Acidum Salicylicum; Acidum Sulphurosum; Acriflavina; Argenti Nitras; Argenti Proteinas; Benzenum; Betanaphthol; Bismuthi Tribromphenas; Chloramina; Chromii Trioxidum; Chrysarobinum; Dichloramina; Hydrargyri Iodidum Rubrum; Hydrargyri Perchloridum; Hydrargyrum Ammoniatum; Ichthammol; Iodoformum; Iodum; Liquor Calcis Sulphuratæ; Liquor Formaldehydi; Liquor Hydrogenii Peroxidi; Magenta; Mercurochromum; Methylthioninæ Chloridum; Phenol; Pix Carbonis; Pix Liquida; Proflavina; Pyrogallol; Resorcinol; Rubrum Scarlatinum; Sulphur Præcipitatum; Trinitrophenol; Viride Malachitum; Viride Nitens.

For the eye.—
Acidum Boricum; Æthylhydrocupreinæ Hydrochloridum; Argenti Nitras; Argenti Proteinas; Cupri Sulphas; Hydrargyri et Zinci Cyanidum; Hydrargyri Oxidum Flavum; Hydrargyri Oxycyanidum; Ichthammol; Potassii Hydroxyquinolini Sulphas; Zinci Sulphas.

For the nose.—
Acidum Boricum; Argenti Proteinas; Borax; Camphora; Liquor Hydrogenii Peroxidi; Menthol; Oleum Eucalypti; Thymol.

For the mouth and throat.—
Acidum Boricum; Argenti Nitras; Argenti Proteinas; Chloramina; Chromii Trioxidum; Eugenol; Gargarisma Chlori; Hydrargyri Perchloridum; Liquor Calcis Chlorinatæ; Liquor Cresolis Saponatus; Liquor Hydrogenii Peroxidi; Liquor Sodæ Chlorinatæ Chirurgicalis; Phenol; Potassii Chloras; Potassii Permanganas; Sodii Perboras; Thymol; Viride Malachitum; Viride Nitens; Zinci Chloridum.

For the urethra and bladder.—
Acriflavina; Argenti Nitras; Argenti Proteinas; Hydrargyri Oxycyanidum; Mercurochromum; Potassii Hydroxyquinolini Sulphas; Potassii Permanganas; Proflavina; Viride Malachitum; Viride Nitens; Zinci Sulphas; Zinci Phenolsulphonas.

For the vagina.—
Acidum Boricum; Acriflavina; Argenti Proteinas; Glycerinum; Hexyl-resorcinol; Hydrargyri Oxycyanidum; Hydrargyri Perchloridum; Ichthammol; Liquor Cresolis Saponatus; Magenta; Mercurochromum; Methylthioninæ Chloridum; Phenol; Potassii Permanganas; Trinitrophenol; Zinci Phenolsulphonas.

For the rectum.—
Acriflavina; Argenti Nitras; Argenti Proteinas; Potassii Permanganas.

Pharmacological Index—*Continued.*

For open wounds.—
Acidum Boricum; Acriflavina; Euflavina; Hydrargyri et Zinci Cyanidum; Hydrargyri Iodidum Rubrum; Hydrargyri Perchloridum; Ichthammol; Liquor Hydrogenii Peroxidi; Liquor Sodæ Chlorinatæ Chirurgicalis; Potassii Permanganas; Trinitrophenol; Zinci Sulphas.

For internal administration.

Stomachic.—
Creosotum; Oleum Cubebæ; Resorcinol.

Intestinal.—
Acidum Acetylsalicylicum; Betanaphthol; Bismuthi Salicylas; Creosotum; Euflavina; Guaiacol; Hydrargyri Perchloridum; Hydrargyri Subchloridum; Lac Coactum; Phenol; Potassii Guaiacolsulphonas; Salol; Thymol. (See also Cathartics.)

Urinary.—
(*i*) Ammonii Benzoas; Buchu; Copaiba; Cubeba; Hexamina; Hexyl-resorcinol; Lithii Benzoas; Methylthioninæ Chloridum; Oleum Cubebæ; Oleum Juniperis; Oleum Santali; Salol; Sodii Benzoas.

(*ii*) (*to render the urine acid*): Acidum Hydrochloricum Dilutum; Ammonii Benzoas; Ammonii Chloridum; Ammonii Nitras; Sodii Phosphas Acidus.

(*iii*) (*to render the urine alkaline*): Magnesii Hydroxidum; Potassii Bicarbonas; Potassii Citras; Sodii Acetas; Sodii Bicarbonas; Sodii Citras; Sodii et Potassii Tartras.

Respiratory.—
Creosotum; Cubeba; Potassii Guaiacolsulphonas; Terebenum.

For intravenous injection.—
Hydrargyri Perchloridum; Mercurochromum; Neoarsphenamina; Viola Crystallina.

Antispasmodics.—Substances used to relieve spasmodic muscular contractions.

Respiratory.—
Adrenalina; Amylis Nitris; Atropina; Belladonna; Benzylis Benzoas; Chloroformum; Codeina (and its salts); Diamorphinæ Hydrochloridum; Ephedrina (and its salts); Hyoscyamus; Lobelia; Stramonium.

Intestinal.—
Atropina; Belladonna; Diamorphinæ Hydrochloridum; Codeina (and its salts); Hyoscina; Hyoscyamina; Hyoscyamus; Morphina (and its salts); Opium.

Aperients.—See Cathartics.

Pharmacological Index—*Continued.*

Aphrodisiacs.—Substances which increase sexual desire.

Alcohol; Cannabis; Cantharidinum; Damiana; Nux Vomica; Phosphorus; Strychnina; Yohimbina.

Astringents.—Substances which tend to contract mucous membranes and raw surfaces.

By constriction of the arterioles.—Adrenalina; Ephedrina.

By absorption of water.—Glycerinum.

By the precipitation of protein in the superficial cells.

Internal.—Acetannin; Acidum Sulphuricum Dilutum; Aluminii Hydroxidum; Bismuthi Carbonas; Bismuthi Subnitras; Bismuthi Tannas; Catechu; Catechu Nigrum; Cinchona; Cinnamomum; Creta; Guarana; Hæmatoxylum; Kino Eucalypti; Krameria; Opium; Plumbi Acetas; Quercus.

External.—Acidum Lacticum; Acidum Tannicum; Alumen; Alumen Ferricum; Aluminii Acetas; Aluminii Hydroxidum; Argenti Nitras; Bismuthi Carbonas; Bismuthi Subgallas; Bismuthi Subnitras; Calamina; Calcii Hydroxidum; Cupri Sulphas; Ferri Perchloridum; Galla; Hamamelis; Kino; Kino Eucalypti; Krameria; Plumbi Acetas; Plumbi Carbonas; Plumbi Oleas; Potassii Chloras; Zinci Carbonas; Zinci Chloridum; Zinci Oxidum; Zinci Phenolsulphonas; Zinci Sulphas.

Carminatives.—Substances which relieve flatulence, and produce a feeling of warmth and comfort in the stomach.

Æther; Alcohol; Anethum; Anisum; Anthemis; Aurantii Cortex; Camphora; Capsicum; Cardamomum; Carum; Caryophyllum; Cassiæ Cortex; Chloroformum; Cinnamomum; Coriandrum; Cuminum; Fœniculum; Menthol; Myristica; Oleum Anethi; Oleum Anisi; Oleum Anthemidis; Oleum Cari; Oleum Caryophylli; Oleum Cinnamomi; Oleum Coriandri; Oleum Fœniculi; Oleum Lavandulæ; Oleum Menthæ Piperitæ; Oleum Menthæ Viridis; Oleum Myristicæ; Pimenta; Zingiber.

Cathartics.—Substances which assist or induce evacuation of the bowel.

Cholagogues.—Substances which increase the secretion or flow of bile.

Acidum Nitro-hydrochloricum Dilutum; Acidum Oleicum; Fel Bovinum; Hydrargyri Subchloridum; Magnesii Sulphas; Oleum Olivæ; Podophylli Resina; Sapo Durus; Sodii Salicylas; Sodii Tauroglycocholas.

Laxatives.

Cassiæ Fructus; Euonymus; Ficus; Sulphur Præcipitatum; Sulphur Sublimatum; Tamarindus.

Pharmacological Index—*Continued.*

Softening and bulk producing.—Agar; Ispaghula; Linum; Paraffinum Liquidum; Paraffinum Molle; Psyllium; Tragacantha.

Saline Aperients.—Magnesii Carbonas Levis; Magnesii Carbonas Ponderosus; Magnesii Hydroxidum; Magnesii Oxidum Leve; Magnesii Oxidum Ponderosum; Magnesii Sulphas; Potassii Tartras Acidus; Sodii et Potassii Tartras; Sodii Phosphas; Sodii Sulphas.

Acting on the colon.—Aloe; Aloinum; Cascara Sagrada; Rheum; Sennæ Folium; Sennæ Fructus.

Acting on the small intestine.—Oleum Ricini; Phenolphthaleinum.

Drastic Purgatives.
Aloe; Aloinum; Cambogia; Colocynthis; Hydrargyri Subchloridum; Hydrargyrum; Ipomœa; Jalapa; Jalapæ Resina; Jalapin; Kaladana; Leptandra; Magnesii Sulphas; Oleum Crotonis; Oleum Ricini; Podophylli Resina; Podophyllum; Scammoniæ Resina; Turpethum.

By hypodermic injection.— Ergotoxina; Extractum Pituitarii Liquidum; Physostigmina

Per rectum.— Fel Bovinum; Glycerinum; Oleum Olivæ; Sapo Durus.

Caustics.—Substances which destroy living tissues to which they are applied.

By consuming the tissue.—Acidum Aceticum Glaciale; Acidum Hydrochloricum; Acidum Nitricum; Acidum Salicylicum; Acidum Sulphuricum; Acidum Trichloraceticum; Calcii Oxidum; Chromii Trioxidum; Potassii Hydroxidum; Sodii Hydroxidum.

By precipitation of protein.—Alumen Exsiccatum; Aluminii Sulphas; Argenti Nitras; Cupri Nitras; Cupri Subacetas; Cupri Sulphas; Liquor Antimonii Chloridi; Phenol; Zinci Chloridum.

By inflammation, producing a slough.—
Carbonei Dioxidum (solid).

Cholagogues.—See Cathartics.

Counter-irritants.—Substances which, on local application, stimulate nerve endings and produce vasodilation.

Rubefacients.—Acidum Aceticum; Alcohol; Ammonia (Solution); Camphora; Cantharidinum; Cantharis; Capsicum; Chloroformum; Eucalyptol; Methylis Salicylas; Oleum Cajuputi; Oleum Camphoræ Rectificatum; Oleum Myristicæ; Oleum Sassafras; Oleum Sinapis Volatile; Oleum Succini; Oleum Terebinthinæ; Oleum Thymi; Sinapis.

Pharmacological Index—*Continued.*

Vesicants.—Substances which cause inflammation and produce a blister.

Cantharidinum; Cantharis; Carbonei Dioxidum (solid); Oleum Crotonis; Oleum Sinapis Volatile; Sinapis.

Demulcents.—Substances which have a soothing and protective action on mucous membranes.

Acacia; Agropyrum; Althæa; Amygdala Dulcis; Cetraria; Chondrus; Gelatinum; Glycerinum; Glycyrrhiza; Linum; Maranta; Mel Depuratum; Oleum Amygdalæ; Oleum Arachis; Oleum Olivæ; Oleum Sesami; Tragacantha; Tussilaginis Flos; Ulmus Fulva.

Deodorants.—Substances which counteract fœtid smells. (See also Antiseptics.)

Aluminii Acetas; Calx Chlorinata; Carbo; Chromii Trioxidum; Creosotum; Cresol; Guaiacol; Liquor Formaldehydi; Liquor Hydrogenii Peroxidi; Oleum Eucalypti; Oleum Picis; Potassii Permanganas; Sodii Perboras; Terebenum; Thymol.

Depilatories.—Substances used for the removal of hair.

Local application.—Baryta Sulphurata; Calx Sulphurata.

Internal administration.—Thallii Acetas.

Diaphoretics.—Substances which induce sweating.

Aconitum; Alcohol; Ammonii Acetas; Ammonii Chloridum; Ammonii Citras; Antimonii et Potassii Tartras; Antimonii Trioxidum; Apomorphinæ Hydrochloridum; Camphora; Ipecacuanha; Opium; Physostigmina; Pilocarpina; Potassii Citras; Quininæ Disalicylosalicylas; Sodii Salicylas; Spiritus Ætheris Nitrosi.

Digestives.—Substances which assist the normal process of digestion.

Diastasum; Extractum Malti; Pancreatinum; Papainum; Pepsinum.

Disinfectants.—See Antiseptics.

Diuretics.—Substances which increase the renal secretion.

Saline.—Ammonii Acetas; Ammonii Chloridum; Ammonii Citras; Ammonii Nitras; Ammonii Phosphas; Lithii Carbonas; Lithii Chloridum; Lithii Citras; Potassii Acetas; Potassii Bicarbonas; Potassii Citras; Potassii Nitras; Potassii Tartras; Potassii Tartras Acidus; Sodii Acetas; Sodii Benzoas; Sodii Citras; Sodii Formas.

Pharmacological Index—*Continued.*

Kidney Irritants.—Agropyrum; Buchu; Copaiba; Cubeba; Guaiaci Resina; Kava; Oleum Juniperi; Oleum Santali; Oleum Terebinthinæ; Scoparium; Uva Ursi.

Cardiac.—Convallaria; Digitalis; Scilla; Strophanthus.

Purine derivatives.—Caffeina; Theobromina; Theobromina et Sodii Salicylas; Theophyllina et Sodii Acetas.

Mercurial.—Hydrargyri Subchloridum; Hydrargyrum.

Intravenous injection.—Dextrosum; Sodii Bicarbonas; Sodii Carbonas; Sodii Chloridum.

Emetics.—Substances which cause vomiting.

Alumen; Antimonii et Potassii Tartras; Apomorphinæ Hydrochloridum; Cupri Sulphas; Emetinæ Hydrochloridum; Ipecacuanha; Sinapis; Sodii Chloridum; Zinci Sulphas.

Emmenagogues.—Substances which are used to induce the onset of the menstrual flow.

Drastic Purgatives.—Aloe; Jalapa; Oleum Ricini.

Irritants.—Apiol; Oleum Petroselini; Oleum Pulegii; Oleum Rutæ; Oleum Sabinæ; Potassii Permanganas; Sabina.

Stimulants of uterine muscle.—Caulophyllum; Ergota; Gossypii Cortex; Quinina.
Oestrinum; Pituitarium (Anterior Sex Hormone).

Emollients.—Substances which protect the skin from irritation and soften the tissues.

Adeps; Adeps Lanæ; Cera Alba; Cera Flava; Cetaceum; Glycerinum; Oleum Amygdalæ; Oleum Arachis; Oleum Cocois; Oleum Gossypii; Oleum Olivæ; Oleum Sesami; Paraffinum Liquidum; Paraffinum Molle.

Expectorants.—Substances which increase or assist bronchial secretion.

Acidum Citricum; Ammonii Acetas; Ammonii Benzoas; Ammonii Carbonas; Ammonii Chloridum; Ammonii Citras; Anisum; Antimonii et Potassii Tartras; Apomorphinæ Hydrochloridum; Balsamum Tolutanum; Benzoinum; Cocillana; Codeina; Glycyrrhiza; Ipecacuanha; Marrubium; Scilla; Senega; Sodii Acetas; Sodii Benzoas; Terebenum; Terpini Hydras; Urginea.

Hæmatinics.—Substances which, in anæmia, increase the quantity or hæmoglobin content of red blood corpuscles.

In macrocytic anæmias.—Extractum Hepatis Liquidum; Extractum Hepatis Siccum; Ventriculus Desiccatus.

Pharmacological Index—*Continued.*

In microcytic anæmias.—Arseni Trioxidum; Cupri Sulphas; Ferri Cacodylas; Ferri Carbonas Saccharatus; Ferri et Ammonii Citro-arsenis; Ferri et Mangani Citras; Ferri et Quininæ Citras; Ferri Iodidum; Ferri Phosphas Saccharatus; Ferri Quininæ et Strychninæ Citras; Ferri Sulphas; Ferrum Redactum; Hæmoglobinum; Mangani Chloridum; Mangani Glycerophosphas; Mangani Hypophosphis; Mangani Peroxidum; Medulla Rubra; Sodii Cacodylas.

Hæmostatics.—Substances which arrest hæmorrhage.

Internal Hœmorrhage.—Acidum Sulphuricum Aromaticum; Adrenalina; Calcii Chloridum; Calcii Lactas; Catechu; Cotarninæ Chloridum; Cotarninæ Phthalas; Emetina; Ephedrina; Ergota; Ergotoxina; Ergotoxinæ Æthanosulphonas; Ergotoxinæ Phosphas; Extractum Pituitarii Liquidum; Gelatinum; Hydrastina; Hydrastinina; Hydrastis; Plumbi Acetas; Serum Normale; Sodii Citras.

External Hœmorrhage.—Acidum Tannicum; Adrenalina; Alumen; Cotarninæ Chloridum; Cotarninæ Phthalas; Cupri Sulphas; Ferri Perchloridum; Galla; Hamamelidis Cortex; Hamamelis; Hydrastinæ Hydrochloridum; Hydrastis; Kino; Krameria; Liquor Hydrogenii Peroxidum; Oleum Terebinthinæ; Serum Normale.

Hypnotics.—Substances which promote sleep.

Non-analgesic.—Alcohol; Allobarbitonum; Barbitonum; Barbitonum Solubile; Carbromalum; Chloralformamidum; Chloralis Hydras; Methylsulphonal; Phenobarbitonum; Phenobarbitonum Solubile; Sulphonal.

Analgesic.—Butylchloralis Hydras; Codeina; Codeinæ Phosphas; Diamorphinæ Hydrochloridum; Hyoscinæ Hydrobromidum; Hyoscyaminæ Hydrobromidum; Morphina (and its salts); Opium; Papaveretum; Paraldehydum; Urethanum.

Laxatives.—See Cathartics.

Miotics.—Substances which cause contraction of the pupil and diminution of ocular tension.

Physostigmina; Pilocarpina.

Mydriatics.—Substances which cause dilatation of the pupil, paralysis of the ciliary muscle and temporary loss of accommodation.

Atropina; Atropinæ Sulphas; Belladonna; Cocaina; Cocainæ Hydrochloridum; Duboisinæ Sulphas; Ephedrina; Ephedrinæ Hydrochloridum; Homatropinæ Hydrobromidum; Hyoscina; Hyoscinæ Hydrobromidum.

Pharmacological Index—*Continued.*

Oxytocics.—Substances which cause contraction of the uterine muscle and are used to hasten parturition.

Extractum Pituitarii Liquidum; Oleum Ricini; Quinina (and its salts).

Parasiticides.—Substances employed to kill animal or vegetable parasites on the skin or hair.

Acidum Benzoicum; Acidum Salicylicum; Balsamum Peruvianum; Benzenum; Cevadilla; Chlorbutol; Chrysarobinum; Derris; Hydrargyri Iodidum Rubrum; Hydrargyri Perchloridum; Hydrargyrum; Hydrargyrum Ammoniatum; Liquor Formaldehydi; Magenta; Oleum Sassafras; Pix Carbonis; Potassa Sulphurata; Pyrethri Flos; Safrolum; Sodii Sulphis; Staphisagria; Sulphur Sublimatum; Sulphuris Chloridum; Sulphuris Iodidum; Veratrinum.

Purgatives.—See Cathartics.

Rubefacients.—See Counter-irritants.

Sclerosants.—Substances used for their sclerosing effect in varicose veins, hæmorrhoids, hydrocele and varicocele.

Dextrosum; Lithii Salicylas; Phenol; Quininæ et Ureæ Hydrochloridum; Quininæ Hydrochloridum (with Urethanum); Sodii Chloridum; Sodii Morrhuas; Sodii Salicylas.

Sedatives.—Substances which depress the action of nerve centres or of the circulatory system.

Gastric.—Acidum Hydrocyanicum Dilutum; Ammonii Bromidum; Aqua Laurocerasi; Bismuthi Carbonas; Bismuthi Citras; Bismuthi et Ammonii Citras; Bismuthi Salicylas; Bismuthi Subnitras; Bismuthi Tannas; Carbonei Dioxidum (solution); Cerii Oxalas; Chloralformamidum; Chloralis Hydras; Chlorbutol; Chloroformum; Coca; Cocaina; Morphina; Opium; Papaveretum; Potassii Bicarbonas; Potassii Bromidum; Sodii Bicarbonas; Sodii Bromidum.

Respiratory.—Acidum Hydrobromicum Dilutum; Æther; Æthylmorphinæ Hydrochloridum; Ammonii Bromidum; Amylis Nitris; Bromoformum; Chloralis Hydras; Chloroformum; Codeina; Codeinæ Phosphas; Diamorphinæ Hydrochloridum; Gelsemina; Gelsemium; Grindelia; Morphina (and its salts); Opium; Papaveretum; Potassii Bromidum; Prunus Serotina; Sodii Bromidum; Sodii Nitris; Spiritus Ætheris Nitrosi.

Central nervous system. — Acidum Acetylsalicylicum; Acidum Hydrobromicum Dilutum; Acidum Hydrocyanicum Dilutum; Ammonii Bromidum; Camphoræ Monobromidum; Gelsemina; Gelsemium; Hyoscinæ Hydrobromidum; Hyoscyaminæ Hydrobromidum; Lithii Bromidum; Morphina (and its salts); Opium; Phenacetinum; Phenazonum; Physostigminæ Sulphas; Potassii Bromidum; Sodii Bromidum. (See also Hypnotics.)

Pharmacological Index—*Continued.*

Sialogogues.—Substances which increase the secretion of the salivary glands.

Hydrargyrum (and its salts); Ipecacuanha; Lobelia; Pilocarpina; Potassii Iodidum (and other iodides); Physostigmina.

Styptics.—See Hæmostatics.

Sudorifics.—See Diaphoretics.

Tonics.—Substances which assist nutrition and improve the general tone of the system.

Heart.—Adrenalina; Æther; Alcohol; Ammonii Carbonas; Barii Chloridum; Caffeina; Caffeina et Sodii Benzoas; Caffeina et Sodii Salicylas; Camphora; Digitalis Folium; Digitalinum; Digitoxinum; Extractum Pituitarii Liquidum; Liquor Ammoniæ Dilutus; Nux Vomica; Quinidina; Quinidinæ Sulphas; Scilla; Strophanthinum; Strophanthus; Strychnina (and its salts).

Nerve.—Acidum Formicum (and formates); Acidum Glycerophosphoricum (and glycerophosphates); Acidum Hypophosphorosum (and hypophosphites); Arseni Trioxidum; Cinchona; Ferri Sulphas; Ignatia; Kola; Nux Vomica; Ovolecithinum; Phosphorus; Quinina (and its salts); Strychnina (and its salts).

Stomach.—Acidum Hydrochloricum Dilutum; Acidum Nitricum Dilutum; Acidum Nitro-hydrochloricum Dilutum; Acidum Phosphoricum Dilutum; Acidum Sulphuricum Aromaticum; Acidum Sulphuricum Dilutum; Andrographia; Beberinæ Sulphas; Berberinæ Sulphas; Berberis; Calumba; Canella; Cascarilla; Chiretta; Cinchona; Cinchonidina; Cinchonina; Gentiana; Ignatia; Nux Vomica; Pepsinum; Picrorhiza; Quassia; Quebracha; Quinina; Rheum; Salix; Serpentaria; Taraxacum. (See also Carminatives.)

Vasoconstrictors.—Substances which constrict the blood vessels.

Adrenalina; Caffeina (and its salts); Digitalis Folium; Ephedrina (and its salts); Ergota; Extractum Pituitarii Liquidum; Hydrastina; Nux Vomica; Strychnina (and its salts).

Vasodilators.—Substances which dilate the blood vessels.

Aconitum; Amylis Nitris; Erythritylis Tetranitras Dilutus; Liquor Glycerylis Trinitratis; Pilocarpina; Sodii Nitris; Sodii Thiocyanas; Sparteinæ Sulphas; Yohimbina.

Vermicides, Vermifuges.—See Anthelmintics.

Vesicants.—See Counter-irritants.

Pharmacological Index—*Continued.*

Substances used for their Specific Effect in Certain Diseases

Beri-Beri.—Cerevisiæ Fermentum; Vitamin B concentrates.

Bilharziasis.—Antimonii et Potassii Tartras; Antimonii et Sodii Tartras.

Botulism.—Serum Antibotulinum.

Cancer.—Radium.

Cerebrospinal Meningitis.—Serum Antimeningococcicum.

Diabetis Mellitus.—Insulinum.

Diphtheria.—(Treatment), Antitoxinum Diphthericum.
(Prophylaxis), Toxinum Diphthericum Detoxicatum.

Dysentery.—(Amœbic), Acetarsol; Emetina; Emetinæ et Bismuthi Iodidum; Emetinæ Hydrochloridum; Holarrhena; Kurchi Bismuthi Iodidum.
(Bacillary), Serum Antidysentericum.

Gas Gangrene.—Antitoxinum Welchicum.

Leprosy.—Oleum Chaulmoograe; Oleum Hydnocarpi; Oleum Hydnocarpi Æthylicum; Sodii Chaulmoogras.

Malaria.—Cinchona; Quinetum; Quinidina; Quinidinæ Sulphas; Quinina (and its salts); Totaquina.

Plague.—Serum Antipestis.

Rickets.—Liquor Ergosterolis Irradiati; Vitamin D concentrates.

Scarlet Fever.—(Treatment), Antitoxinum Scarlatinum.
(Prophylaxis), Toxinum Scarlatinum.

Scurvy.—Succus Aurantii; Succus Limonis; Vitamin C concentrates.

Small Pox.—Vaccinum Vacciniæ.

Snake Bite.—Serum Antivenenosum.

Syphilis.—Acetarsol; Arsphenamina; Arsphenamina Argentica; Bismuthi et Sodii Tartras; Bismuthi Salicylas; Bismuthi Subchloridum; Bismuthum Præcipitatum; Hydrargyri Iodidum Flavum; Hydrargyri Perchloridum; Hydrargyri Salicylas; Hydrargyri Subchloridum; Hydrargyrum; Neoarsphenamina; Potassii Iodidum; Sulpharsphenamina; Tryparsonum.

Tetanus.—Antitoxinum Tetanicum.

Trypanosomiasis.—Acetarsol; Methylthioninæ Chloridum; Sodii Aminarsonas; Tryparsonum.

Tuberculosis.—Auri et Sodii Thiosulphas; Tuberculinum Pristinum; Vaccinum Tuberculinum.

Typhoid Fever.—(Prophylaxis), Vaccinum Typho-paratyphosum.

APPENDIX XIV

Substances with Proprietary Trade-Names

The names in the following list are the proprietary names of compounds and preparations described in the British Pharmaceutical Codex and of other proprietary products which may be required in dispensing practice. The information given for each product has been taken from literature issued by the respective makers or agents and includes, in general, an indication of the composition, the therapeutic use and the usual dose. In those cases where the activity of a product is due to the presence of one or more substances described in the British Pharmaceutical Codex, or where it is due to an ingredient stated to have an action similar to that of a substance described in the book, the therapeutic use and dose have not been given, since adequate information on these points is provided in the respective monographs. In order to indicate sources from which further information concerning the products can be obtained, the names of firms or companies associated with their production or distribution are also included.

Considerations of space have made it impossible to include more than a small fraction of the branded products which are available for use in medicine and pharmacy, and the inclusion of a substance in the list does not imply any recommendation or guarantee of purity. In making the selection, preference has been given to proprietary names of substances described in the British Pharmaceutical Codex, and to products depending for their action on substances which are not described in the book. With few exceptions, compounded elixirs, emulsions, mixtures, or ointments containing more or less well-known ingredients have not been included.

When a trade-name is stated to be a brand of a substance described in a monograph in the British Pharmaceutical Codex, it is not intended to imply that the standard laid down in the monograph is also applicable to the branded product, and it is important to note that the majority of names included in the list are registered trade-marks and that when a substance is ordered under its trade-mark description, it is an actionable infringement to supply a product of another maker.

Abrodil.—20 per cent. solution of sodium monoiodomethanesulphonate which contains 52 per cent. of iodine. It is used for retrograde pyelography. (*Bayer Products, London.*)

Acécoline.—Brand of Acetylcholinæ Hydrochloridum. (*Lamatte, Paris; Anglo-French Drug Co., London.*)

Acedicone.—Acetyldihydrocodeinone, a white powder soluble in water. It is administered orally or by subcutaneous injection as a sedative, in doses of 0·0025 to 0·01 gramme ($\frac{1}{25}$ to $\frac{1}{6}$ grain). (*Boehringer, Ingelheim; C. Zimmerman, London.*)

Acetylarsan.—23·6 per cent. solution of diethylamine hydroxyacetylaminophenylarsonate containing the equivalent of 0·05 gramme of arsenic per millilitre. It is used for the same purposes as Sodii Aminarsonas. (*May and Baker, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Acitophosan.—Combination of calcium phenylcinchonate and calcium acetylsalicylate. It is administered in the form of powder or tablets, in doses of 8 to 16 grains, in the treatment of painful rheumatic affections and of influenza. (*Richter, London.*)

Adalin.—Brand of Carbromalum. (*Bayer Products, London.*)

Adexolin.—Vitamin concentrate containing in each millilitre 40,000 units of vitamin A and 2000 international units of vitamin D. It is available in the form of liquid, or in capsules each equivalent to 0·5 millilitre of the liquid, or as a compound emulsion with calcium. (*Glaxo Laboratories, London.*)

Advita.—Preparation containing vitamins A and D, with a blue value of 1250 and containing 1000 units of vitamin D per gramme. It is administered in the form of capsules containing 2 minims. (*Trufood, London.*)

Æthocaine.—Brand of Procainæ Hydrochloridum. (*Nederlandsche Cocainefabriek, Amsterdam; Greef, London.*)

Afenil.—Double compound of calcium chloride and urea supplied in 10 per cent. solution for intravenous calcium treatment. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Agomensin.—Water-soluble ovarian hormone, administered in the treatment of functional amenorrhœa. (*Ciba, London.*)

Agonol.—Benzoic ester of santalol, administered in capsules in place of oil of sandal wood. (*Cognet, Paris; Roberts, London.*)

Agotan.—Brand of Cinchophenum. (*Howards, Ilford.*)

Agurin.—Brand of Theobromina et Sodii Acetas. (*Bayer Products, London.*)

Airol.—Brand of Bismuthi Oxyiodogallas. (*Hoffman-La Roche, London.*)

Alasil.—Combination of calcium acetylsalicylate and Alocol in tablet form. (*Wander, London.*)

Albargin.—Combination of gelatose and silver nitrate, containing 15 per cent. of silver, used for the same purposes as Argenti Proteinas Mite. (*Bayer Products, London.*)

Albarol.—Prepared barium sulphate for an opaque meal. (*May and Baker, London.*)

Alepol.—The sodium salts of a selected fraction of the lower melting-point fatty acids of hydnocarpus oil. It is administered either subcutaneously or intramuscularly as a 3 per cent. w/v solution in 0·5 per cent. w/v aqueous solution of phenol, in doses of 1 millilitre (15 minims), gradually increased to 5 millilitres (75 minims) or more. (*Burroughs Wellcome, London.*)

Alepsal.—Combination of phenobarbitone, 1½ grains, belladonna, $\frac{3}{10}$ grain, and caffeine, $\frac{3}{4}$ grain, in tablet form, administered in the treatment of epilepsy. (*Genevrier, Neuilly; Wilcox Jozeau, London.*)

Alexipon.—Brand of Æthylis Salicylas. (*Richter, London.*)

Alkagen.—Freshly hydrated magnesium oxide, in the form of tablets or lozenges flavoured with oil of peppermint, for use as an antacid. (*Allen and Hanburys, London.*)

Allisatin.—Preparation of garlic and activated charcoal in tablet form, administered in the treatment of intestinal affections. (*Sandoz, London; Brooks and Warburton, London.*)

Allochrysine.—Sodium aurothioproponalsulphonate, containing 35 per cent. of gold. It is administered by intramuscular injection in the treatment of tuberculosis, chronic rheumatism and lupus, in weekly doses of 0·05 to 0·2 gramme ($\frac{3}{4}$ to 3 grains). (*Lumière, Lyons; Anglo-French Drug Co., London.*)

Substances with Proprietary Trade-Names—*Continued.*

Allonal.—Allyl*iso*propylbarbituric acid, 0·06 gramme (1 grain), with amidopyrine, 0·1 gramme (1½ grains) in tablet form, administered as a sedative and hypnotic. (*Hoffman-La Roche, London.*)

Alocol.—Brand of Aluminii Hydroxidum in colloidal form. (*Wander, London.*)

Alopon.—Brand of Papaveretum. (*Allen and Hanburys, London.*)

Alypin.—Brand of Amydricainæ Hydrochloridum. (*Bayer Products, London.*)

Ambrine.—Variety of hard paraffin containing 5 per cent. of oil of amber for use in the treatment of burns, ulcers, etc. (*Anglo-French Drug Co., London.*)

Ametox.—Sterile sodium thiosulphate supplied in ampoules containing the powder or solution. (*May and Baker, London.*)

Amino-Glaucosan.—10 per cent. solution of histamine hydrochloride used in the form of eye-drops as a powerful miotic in the treatment of acute glaucoma. (*Walm, Spangenberg; Saccharin Corporation, London.*)

Amphotropin.—Hexamine camphorate for administration in doses of 0·3 to 1 gramme (5 to 15 grains) in the treatment of infections of the urinary tract. (*Bayer Products, London.*)

Amytal.—*iso*Amylethylbarbituric acid, a white, crystalline powder having a slightly bitter taste. It is very slightly soluble in water, soluble in alcohol and ether, and melts at about 154°. It is administered as a sedative in doses of 0·02 to 0·045 gramme (⅓ to ¾ grain), and as a hypnotic in doses of 0·1 to 0·3 gramme (1½ to 5 grains). As a basal hypnotic, before a general anæsthetic, the dose ranges from 0·2 to 0·6 gramme (3 to 10 grains). (*Eli Lilly, London.*)

Anabolin.—Preparation containing a physiologically tested extract of liver. It is administered orally in the form of tablets, or by intramuscular injection of a solution, in the treatment of functional hypertension. (*Endocrines, Watford.*)

Anæsthesin.—Brand of Benzocaina. (*Bayer Products, London.*)

Anasarcin.—Tablets containing scillipicridin and scillitoxin, glycosides from squill, administered in the treatment of cardiac affections. (*Anasarcin Co., New York; Christy, London.*)

Androstin.—Physiologically standardised total testicular extract for administration in the treatment of impotence and various neuroses and psychoses of genital origin. The tablets, each representing the active principles of 8 grammes of fresh gland, are administered in doses of 3 to 8 daily. For injection, separate ampoules (A and B) are supplied containing respectively the hydrosoluble fraction from the spermatic gland and the lipo-soluble testicular hormone from the interstitial cells. Ampoules A and B are administered alternately, by intramuscular injection. (*Ciba, London.*)

Anestile.—Mixture of methyl and ethyl chlorides for the production of local anæsthesia. (*Bengué, London.*)

Anotal.—The ethylurethane of phenylcinchoninic acid in tablet form. It is administered in the treatment of gout and rheumatic diseases. (*Merck, Darmstadt; Napp, London.*)

Anthrasol.—An oily fluid for external application as a non-staining substitute for tar. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Antibacsyn.—An anti-bacterial solution for injection in the treatment of pneumonia and septic infections. (*Antibody Products, Watford.*)

Antiformin.—Strongly alkaline solution of sodium hypochlorite containing, approximately, available chlorine, 5·7 per cent., sodium hydroxide, 7·8 per cent., and sodium carbonate, 0·3 per cent. A 15 per cent. dilution dissolves non-acid-fast bacteria very rapidly. It has little action on acid-fast organisms, such as the tubercle bacillus, and is used to isolate these organisms from sputum. (*Kuhn, Berlin.*)

Substances with Proprietary Trade-Names—*Continued.*

Antileprol (Chaulmestrol).—The ethyl esters of the fatty acids of chaulmoogra oil. (*Bayer Products, London.*)

Antilusin A.—Specially prepared normal horse serum for or aladministration in doses of 10 millilitres one to three times daily, in the treatment of gastric, duodenal, and other ulcerations. (*Allen and Hanburys, London.*)

Antilusin B.—Specially prepared normal horse serum for local application to suppurating wounds and ulcers. (*Allen and Hanburys, London.*)

Antoxylin.—Pituitary (anterior lobe) extract prepared for hypodermic injection, each millilitre being equivalent to 2 grains of desiccated gland. (*Oxo, London.*)

Antuitrin.—Pituitary (anterior lobe) extract prepared for hypodermic injection. (*Parke Davis, London.*)

Antuitrin S.—Solution of the anterior pituitary-like hormone [see pituitary (anterior lobe) extract]. (*Parke Davis, London.*)

Aolan.—Milk protein prepared for intramuscular injection in treatment by non-specific protein therapy. (*Beiersdorf, Welwyn Garden City.*)

Aphrodine.—Brand of Yohimbina. (*C. Zimmermann, London.*)

Apicosan.—Sterile solution of bee-sting toxin in physiological solution of sodium chloride. It is supplied in three strengths and is administered intramuscularly as a counter-irritant in the treatment of rheumatism, neuralgia, neuritis, and similar affections. (*Wolff, Bielsfeld.*)

Aplexil.—Polyvalent anti-influenzal vaccine. (*May and Baker, London.*)

Apothesine.—Hydrochloride of γ-diethylaminopropyl cinnamate. It is supplied in solution with chloretone, or in tablet form, for use as a local anæsthetic. (*Parke Davis, London.*)

Apyrogen.—Brand of Aqua Sterilisata for intravenous use. (*Allen and Hanburys, London.*)

Arcanol.—Combination of 0·5 gramme (7½ grains) each of acetylsalicylic acid and Novatophan in tablet form. It is used for the same purposes as Cinchophenum. (*Schering, London.*)

Arcolax.—Brand of Psyllium. (*Roberts, London.*)

Arecan.—Solution of procaine hydrochloride with adrenaline. It is supplied in various strengths for use as a local anæsthetic. (*Evans Sons Lescher and Webb, Liverpool.*)

Argein.—Brand of Argenti Proteinas. (*Allen and Hanburys, London.*)

Argyn.—Brand of Argenti Proteinas Mite. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Argyrol.—Brand of Argenti Proteinas Mite. (*Barnes, Philadelphia; Fassett and Johnson, London.*)

Arhéol.—Capsules containing 0·2 gramme of santalol. (*Astier, Paris; Wilcox Jozeau, London.*)

Aristochin.—Carbonic ester of quinine, occurring as a tasteless, insoluble powder. It is used for the same purposes as quinine. (*Bayer Products, London.*)

Aristol.—Brand of Thymolis Iodidum. (*Bayer Products, London.*)

Arrhenal.—Brand of Disodii Methylarsonas. (*Adrian, Paris.*)

Arsacetin.—Sodium acetylarsanilate. It is used in the treatment of malaria, syphilis and trypanosomiasis. (*Bayer Products, London.*)

Arsamin.—Brand of Sodii Aminarsonas. (*Martindale, London.*)

Arseno-argenticum.—Brand of Arsphenamina Argentica. (*May and Baker, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Arsenobenzol-Billon.—Brand of Arsphenamina. (*Société Parisienne d'Expansion Chimique, Paris.*)

Arsenobillon.—Brand of Arsphenamina. (*May and Baker, London.*)

Arthigon.—Polyvalent gonococcal vaccine containing a specific and a non-specific stimulant. (*Schering, London.*)

Arthrytin.—Ammonium *o*-iodoxybenzoate, a white, crystalline powder. It is administered by the mouth or by intravenous injection, in doses of 0·5 to 1 gramme (7½ to 15 grains), in the treatment of arthritis and neuritis. (*May and Baker, London.*)

Arvitin.—Brand of Argenti Proteinas Mite. (*Johnson and Sons, London.*)

Asciatine.—Amidopyrinebutylchloral hydrate in tablet form for oral administration as an analgesic and hypnotic. (*May and Baker, London.*)

Asparol.—Combination of calcium acetylsalicylate and caffeine in tablet form, each tablet containing the equivalent of 0·4 gramme (6 grains) of acetylsalicylic acid and 0·05 gramme (¾ grain) of caffeine. (*Stroschein, Berlin; Christy, London.*)

Aspirgran.—Brand of Acidum Acetylsalicylicum in granular form. (*Monsanto, London.*)

Aspriodine.—Acetyliodosalicylic acid. It is administered in the form of tablets or cachets in doses of 0·3 gramme (5 grains) per day in the treatment of rheumatic conditions. (*Martindale, London.*)

Aspro.—Brand of Acidum Acetylsalicylicum in tablet form. (*Gollin, Slough.*)

Atebrin.—A synthetic acridine derivative. It is administered in tablet form in the treatment of malaria. (*Bayer Products, London.*)

Atocin.—Brand of Cinchophenum. (*Cavendish Chemical Co., London.*)

Atophan.—Brand of Cinchophenum. (*Schering, London.*)

Atophanyl.—Cinchophen-sodium with sodium salicylate. It is administered by intramuscular or intravenous injection. (*Schering, London.*)

Atoquinol.—Allyl phenylquinolincarboxylate in tablet form. It is used for the same purposes as Cinchophenum. (*Ciba, London.*)

Atoxyl.—Brand of Sodii Aminarsonas. (*Boehden, Berlin.*)

Auremetine.—Compound of auramine and emetine periodide containing 28 per cent. of emetine and 16 per cent. of auramine. It is administered in the treatment of amœbic dysentery in doses of 1 grain four times daily. (*Martindale, London.*)

Aurobin.—Brand of Auri et Sodii Thiosulphas. (*Richter, London.*)

Avantine.—Brand of Alcohol Isopropylicum. (*Howards, Ilford.*)

Avenyl.—2-Myristoxymercuri-3-hydroxybenzaldehyde. It is used in the treatment of leprosy complicated with syphilis, and is administered by subcutaneous injection as a 0·25 per cent. w/v solution in hydnocarpus oil, or as a 0·5 per cent. w/v solution in ethyl esters of hydnocarpus oil, in doses of 1 millilitre (15 minims), gradually increased. (*Burroughs Wellcome, London.*)

Avertin.—Solution of tribromethyl alcohol in amylene hydrate for use as a basal hypnotic. It is administered by the rectum, in doses of 0·1 to 0·15 gramme per kilogram body weight, with a maximum dose of 10 grammes, as a 2·5 to 3 per cent. aqueous dilution of the solution. The diluted liquid should not be acid to congo-red. (*Bayer Products, London.*)

Avoleum.—Concentrated preparation of vitamin A obtained from mammalian liver. It is supplied in capsules containing 3 minims. (*British Drug Houses, London.*)

B.A.C. Powder.—Equal parts of dried *Bacillus Acidophilus* and *B. Bulgaricus* in a living state. It is administered with milk in the treatment of various intestinal affections. (*Evans Sons Lescher and Webb, Liverpool.*)

Substances with Proprietary Trade-Names—*Continued.*

Bacté-phages.—Therapeutic bacteriophages in various combinations in ampoules for oral use, or local application. The strains of bacteria employed include those adapted to *Bacillus coli*, staphylococci, streptococci, pneumobacilli and *B. dysenteriæ*. (*Robert et Carrière, Paris; Anglo-French Drug Co., London.*)

Barkite.—Brand of Methylcyclohexanylis Oxalas. (*Howards, Ilford.*)

Barolac.—A 30 per cent. suspension of barium sulphate for use as an opaque meal. (*Burroughs Wellcome, London.*)

B.C.G. Vaccine.—A vaccine prepared from an attenuated strain of bovine tubercle bacilli (Bacille Calmette-Guérin) successively subcultured until no longer capable of producing progressive tuberculosis in animals. It is administered orally or by injection in the prophylaxis of infants against tuberculosis. (*Pasteur Institute, Paris.*)

Belladenal.—Combination of Bellafoline, $\frac{1}{200}$ grain, and phenobarbitone, $\frac{1}{4}$ grain, in tablet form. It is administered as a sedative in the treatment of migraine and epilepsy. (*Sandoz, London; Brooks and Warburton, London.*)

Belladonna-Neutralon.—Preparation of Neutralon with 0·6 per cent. of extract of belladonna. (*Schering, London.*)

Bellafoline.—Total alkaloids of belladonna leaf prepared for oral or hypodermic administration. (*Sandoz, London; Brooks and Warburton, London.*)

Bemax.—Preparation of the seed-germ of certain cereals containing vitamins A, B_1, B_2 and E. It is administered in the treatment of constipation and vitamin B deficiency. (*Vitamins, London.*)

Beta-Borocaine.—Benzamine borate. It is used in 0·25 to 0·5 per cent. solution for the production of surface anæsthesia in ear, nose and throat work. (*British Drug Houses, London.*)

Beta-Eucaine Hydrochloride.—Brand of Benzaminæ Hydrochloridum. (*Schering, London.*)

Beta-Eucaine Lactate.—Brand of Benzaminæ Lactas. (*Schering, London.*)

B.F.I.—Bismuth-formic-iodide, supplied in the form of a compound dusting powder or ointment for use as an antiseptic wound dressing. (*Sharp and Dohme, London.*)

Bicreol.—Suspension of precipitated bismuth in an oily basis, containing 0·15 gramme of metallic bismuth per millilitre. (*Burroughs Wellcome, London.*)

Bilein.—Brand of Sodii Tauroglycocholas. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Bi-liposol.—Bismuth camphocarbonate in olive oil solution, containing the equivalent of 0·04 gramme of bismuth per millilitre, for intramuscular injection in the treatment of syphilis. (*Laboratoire Français de Chimiothérapie, Paris; Modern Pharmacals, London.*)

Biocholine.—Solution of choline hydrochloride, containing 0·02 gramme per millilitre, for administration by subcutaneous injection in the treatment of tuberculosis and blackwater fever. (*Robert et Carrière, Paris; Anglo-French Drug Co., London.*)

Biomucine.—Preparation of mucin from gastric mucus. It is supplied in cachets for administration in the treatment of hyperchlorhydria and peptic ulcer. (*Robert et Carrière, Paris; Anglo-French Drug Co., London.*)

Bisantol.—Suspension of bismuth salicylate in oil. (*May and Baker, London.*)

Bisglucol.—Suspension of precipitated bismuth, 20 per cent., in isotonic dextrose solution. (*May and Baker, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Bismarsen.—Soluble compound of sulpharsphenamine with bismuth. It is administered intramuscularly in doses of 0·1 to 0·2 gramme in the treatment of syphilis. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Bismo-cymol.—A basic bismuth salt of camphor-3-carboxylic acid containing 37 to 40 per cent. of bismuth. It is supplied in solution in olive oil containing the equivalent of 0·05 gramme of bismuth per millilitre. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Bismosalvan.—10 per cent. w/v sterile suspension of quinine iodobismuthate in olive oil, for intragluteal injection in the treatment of syphilis. (*Richter, London.*)

Bismosalvan Soluble.—Solution of quinine iodobismuthate for intragluteal injection in the treatment of syphilis. Each millilitre contains the equivalent of 0·0225 gramme (about ⅓ grain) of metallic bismuth. (*Richter, London.*)

Bismosan.—10 per cent. suspension of bismuth salicylate in oil. (*Roberts, London.*)

Bismosol.—Aqueous solution of sodium potassium bismuthotartrate, piperazine and dextrose. (*Poulenc, Paris.*)

Bismostab.—Brand of Injectio Bismuthi. (*Boots, Nottingham.*)

Bismurung.—Preparation of colloidal bismuth oxychloride used as an ointment, or in other forms, in the treatment of skin affections. (*Blythswood Chemical Co., Glasgow.*)

Bismutol.—Oily suspension of sodium potassium bismuthotartrate. It is administered by intramuscular injection in the treatment of syphilis and yaws. (*Martindale, London.*)

Bisoxyl.—Sterile suspension of finely divided bismuth oxychloride, containing 0·1 gramme per millilitre. (*British Drug Houses, London.*)

Bistovol.—Oily suspension of the basic bismuth salt of Stovarsol. It is administered by intramuscular injection in the treatment of syphilis. (*May and Baker, London.*)

Bivatol.—Basic bismuth α-carboxethyl-β-methylnonoate. A lipo-soluble bismuth compound supplied in 2 millilitre ampoules containing the equivalent of 0·07 gramme of bismuth. It is administered by intramuscular injection in the treatment of syphilis, yaws and lupus. (*Laboratoire Français de Chimiothérapie, Paris; Anglo-French Drug Co., London.*)

Borocaine.—Procaine borate. It is used for the same purposes as Procainæ Hydrochloridum. (*British Drug Houses, London.*)

Brominol, Heavy.—Brominated vegetable oil containing 33 per cent. of bromine. It is used for X-ray visualisation. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Brominol, Light.—Brominated preparation of the ethyl esters of the fatty acids of olive oil. It is used for X-ray visualisation. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Bromipin.—Bromine addition product of sesame oil containing 10 or 33 per cent. of bromine. It is used as a substitute for inorganic bromides. (*Merck, Darmstadt; Napp, London.*)

Bromoline.—Flavoured brominated oil containing 10 per cent. of bromine. It is administered internally in place of inorganic bromides. (*Oppenheimer, London.*)

Bromural.—α-Monobromisovalerylcarbamide. It is administered as a sedative and hypnotic in doses of 0·3 to 1 gramme (5 to 15 grains). (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Brosedan.—A preparation of sodium bromide, 25 per cent., and yeast extract. It is administered dissolved in hot water as a sedative bouillon. (*Tammler, Berlin; Coates and Cooper, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Butesin.—*n*-Butyl *p*-aminobenzoate. It occurs as a white, crystalline powder soluble in fixed oils, and is used in the form of a dusting powder or ointment as a local anæsthetic for painful wounds and ulcers. The picrate is employed as an antiseptic local anæsthetic in the form of an ointment or dusting powder. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Butolan.—Carbaminic acid ester of *p*-hydroxydiphenylmethane. It is administered in tablet form as an anthelmintic, particularly in the treatment of oxyuriasis. (*Bayer Products, London.*)

Butyn.—Sulphate of *p*-aminobenzoyl-γ-di-*n*-butylaminopropanol. It is used in 2 per cent. solution as a local anæsthetic, particularly for surface anæsthesia. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Cabiven.—Sterile 66 per cent. solution of dextrose for the injection treatment of varicose veins. (*Thilo, Mainz; Coates and Cooper, London.*)

Cafaspin.—Combination of acetylsalicylic acid and caffeine in tablet form. (*Bayer Products, London.*)

Caffanilide.—Preparation of acetanilide and caffeine administered in doses of 0·2 to 0·6 gramme (3 to 10 grains). (*Duncan Flockhart, Edinburgh.*)

Cafinal.—Combination of Luminal (¾ grain) and caffeine (⅜ grain) in tablet form. (*Bayer Products, London.*)

Calcibronat.—Preparation containing bromine and calcium gluconate. It is administered in granules or in effervescent tablets. (*Sandoz, London; Brooks and Warburton, London.*)

Calcio-Coramine.—Combination of Coramine and calcium thiocyanate in tablet form. It is used instead of Coramine when an expectorant action is required. (*Ciba, London.*)

Calciostab.—Sterile 10 per cent. solution of calcium thiosulphate for injection in the treatment of intoxication arising from the administration of arsenic, bismuth or mercury preparations. (*Boots, Nottingham.*)

Calcium-Diuretin.—Combination of calcium salicylate and the calcium derivative of theobromine. It is used in doses of 0·5 to 1 gramme (8 to 15 grains) for the same purposes as Theobromina et Sodii Salicylas. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Calcium L.B.—Calcium lactobionate, $Ca(C_{12}H_{21}O_{12})_2$. It is supplied in solution in ampoules containing 2 grammes in 5 millilitres, equivalent to 0·1 gramme of calcium, and is administered by intramuscular or subcutaneous injection in the treatment of various forms of calcium deficiency. (*Allen and Hanburys, London.*)

Calcium-Sandoz.—Brand of Calcii Gluconas. It is prepared in various forms for the oral, intravenous, or intramuscular administration of calcium. (*Sandoz, London; Brooks and Warburton, London.*)

Calcosol.—10 or 20 per cent. solution of calcium chloride and urea for the intravenous administration of calcium. (*Richter, London.*)

Calsoma.—An effervescing preparation containing phosphates of calcium, magnesium and sodium for use in the treatment of hyperacidity. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Camphemyl.—10 per cent. solution of camphor in a mixture of methylurethane, monoethylurea and distilled water. It is used in doses of 1 to 3 millilitres as a substitute for oily injections of camphor. (*Ciba, London.*)

Campolon.—An extract of liver prepared for intramuscular injection, 2 millilitres being equivalent to 500 grammes of fresh liver administered orally. (*Bayer Products, London.*)

Caprokol.—Solution of hexyl-resorcinol in olive oil. (*Sharp and Dohme, London; British Drug Houses, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Carbitol.—Brand of diethyleneglycolmonoethylether. (*Carbide and Carbon Chemicals, New York.*)

Carboserin.—Brand of Carbo Activatus. (*Bayer Products, London.*)

Cardiazol.—Pentamethylenetetrazol, a white, crystalline powder soluble in water. It is used as a cardiac and respiratory stimulant and is administered orally in solution or by subcutaneous injection in doses of 1½ to 3 grains. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Cargentos.—Brand of Argenti Proteinas Mite. (*Sharp and Dohme, London.*)

Chinamin.—Solution containing a neutral salt of quinine, with adrenaline and an extract of hamamelis, for spraying into the nostrils in the prophylaxis and treatment of hay fever. (*Allen and Hanburys, London.*)

Chineonal.—Quinine diethylbarbiturate. It is administered as a sedative and antipyretic. (*Merck, Darmstadt; Napp, London.*)

Chinethan.—Sterile solution of quinine dihydrochloride and urethane administered by intramuscular injection in the treatment of malaria, pneumonia, influenza and other diseases. (*Richter, London.*)

Chiniofon.—Iodohydroxyquinolinesulphonic acid mixed with sodium bicarbonate. It occurs as a yellow powder, soluble in water, and is administered as an antiseptic in the treatment of amœbic dysentery, in doses of 0·25 to 1 gramme (4 to 15 grains) three times a day. It may also be administered by rectal injection of 200 millilitres of a 0·5 to 2·5 per cent. solution. (*Searle, Chicago.*)

Chinosol.—Brand of Potassii Hydroxyquinolini Sulphas. (*Chinosolfabrik, Hamburg; C. Zimmermann, London.*)

Chlorazene.—Brand of Chloramina. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Chloretone.—Brand of Chlorbutol. (*Parke Davis, London.*)

Chlorostab.—Suspension of bismuth oxychloride in 5 per cent. dextrose solution. It is supplied in two strengths containing respectively the equivalent of 0·16 and 0·20 gramme of metallic bismuth per millilitre. (*Boots, Nottingham.*)

Chloroxyl.—Cinchophen hydrochloride. (*Eli Lilly, London.*)

Chloryl Anæsthetic.—Brand of Æthylis Chloridum. (*Duncan Flockhart, Edinburgh.*)

Chlorylen.—Brand of Trichlorethylenum. (*Schering, London.*)

Choleval.—A compound of colloidal silver and sodium cholate for use in the treatment of gonorrhœa. (*Merck, Darmstadt: Napp, London.*)

Chrismol.—Brand of Paraffinum Liquidum. (*Allen and Hanburys, London.*)

Cibalbumin.—Aqueous solution of animal protein administered hypodermically, intravenously, or intramuscularly in doses of 2 to 10 millilitres in treatment by non-specific protein therapy. (*Ciba, London.*)

Cibalgin.—Amidopyrine with Dial. It is supplied in the form of tablets or in solution for oral or intravenous administration as a sedative. Each tablet represents 0·22 gramme (3½ grains) of amidopyrine and 0·03 gramme (½ grain) of Dial. (*Ciba, London.*)

Cignolin.—Dioxyanthranol. It is used in the form of a paint or ointment containing 0·25 to 2 per cent. as a non-staining substitute for chrysarobin in the treatment of various skin diseases. (*Bayer Products, London.*)

Cincaine.—*iso*Propylhydrocupreine hydrochloride. It is used as a local anæsthetic. (*Howards, Ilford.*)

Citobaryum.—Prepared barium sulphate for use as a barium meal. (*Merck, Darmstadt; Napp, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Coagulen-Ciba.—A hæmostatic derived from normal bovine cells. It is supplied in the form of powder and ampoules; the former is used locally for treating accessible hæmorrhage and the latter for internal hæmorrhage. (*Ciba, London.*)

Codeonal.—Combination of codeine diethylbarbiturate, 2 parts, and sodium diethylbarbiturate, 15 parts, in tablet form. It is administered in doses of 2½ to 7½ grains as a sedative and hypnotic. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Colitique.—Suspension of killed *Bacillus coli* prepared for oral administration or for subcutaneous injection in the treatment of *B. coli* infections. (*Astier, Paris; Wilcox Jozeau, London.*)

Collargol.—Colloidal compound of albumen and silver, containing at least 70 per cent. of silver. It is used for the same purposes as Argenti Proteinas. (*Heyden, Dresden; Braun, London.*)

Colliron.—Preparation of colloidal iron (10 per cent.), with a trace of copper, administered in doses of 1 to 4 fluid drachms in the treatment of secondary anæmias and allied conditions. (*Evans Sons Lescher and Webb, Liverpool.*)

Colonol.—Brand of Paraffinum Liquidum. (*Kaylene, London.*)

Compral.—Combination of amidopyrine and trichlorethylurethane in the form of tablets containing 7½ grains. It is administered as an analgesic and sedative in doses of one or two tablets. (*Bayer Products, London.*)

Contramine.—Diethylammonium diethyldithiocarbamate. It is administered intramuscularly in the treatment of gonorrhœa, chronic arthritis and metallic intoxication, in doses of 0·05 to 0·25 gramme (¾ to 4 grains) dissolved in 1 to 2 millilitres (15 to 30 minims) of sterile water. It may also be applied locally in the form of bougies, pessaries, or suppositories. (*British Drug Houses, London.*)

Coramine.—Pyridine-β-carboxylic acid diethylamide, a yellowish liquid, almost odourless and tasteless, and miscible with water in all proportions. It is used as a cardiac and respiratory stimulant, and is supplied as a 25 per cent. flavoured solution for oral administration in doses of 1 to 2 millilitres (15 to 30 minims). It is also prepared for subcutaneous, intravenous, or intramuscular injection. (*Ciba, London.*)

Cortigen.—Brand of Extractum Suprarenalis Corticis. (*Richter, London.*)

Creosotal.—Brand of Creosoti Carbonas. (*Heyden, Dresden; Braun, London.*)

Crinex.—Ovarian extract, in the form of an alcoholic solution, containing keto-hydroxyoestrin and other principles. It is administered in doses of 12 to 25 minims daily. (*Continental Laboratories, London.*)

Crisalbine.—Brand of Auri et Sodii Thiosulphas. (*May and Baker, London.*)

Cryogenine.—Phenylsemicarbazide. It is administered as an antipyretic in the form of tablets in doses of 0·2 to 1 gramme (3 to 15 grains). (*Lumière, Lyons; Anglo-French Drug Co., London.*)

Cuprase.—Colloidal suspension of copper hydroxide administered by intramuscular injection in the treatment of cancer. (*Ducatte, Paris; Anglo-French Drug Co., London.*)

Cuprentum.—Ointment of soluble copper citrate, 5 per cent., used in the treatment of trachoma and of granulations of the eye-lid. (*Allen and Hanburys, London.*)

Cuprol.—Copper salt of nucleinic acid. It is applied topically as an astringent in the treatment of ulcers and fistulæ, and in solution for ophthalmic diseases. (*Parke Davis, London.*)

Cycloform.—Alkyl ester of *p*-aminobenzoic acid. It is supplied in the form of an ointment with zinc oxide and extract of hamamelis for use as an antiseptic and astringent. (*Bayer Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Cylotropin.—Solution containing in 5 millilitres, Urotropin, 30 grains, sodium salicylate, 12 grains, and caffeine sodium salicylate, 3 grains. It is administered by intramuscular or intravenous injection in the treatment of infective diseases of the urinary tract. (*Schering, London.*)

Cystazol.—A combination of hexamine and sodium benzoate in tablet form. It is administered in doses of 0·3 to 1 gramme (5 to 15 grains) in the treatment of cystitis and bacterial infections of the urinary tract. (*Allen and Hanburys, London.*)

Cystopurin.—Hexamine sodium acetate. It is administered in doses of 1 to 2 grammes (15 to 30 grains) as a diuretic and in the treatment of cystitis. (*Genatosan, Loughborough.*)

Davitamon.—Vitamin preparations containing vitamin A or D, or both. Davitamon A is supplied in oily solution containing 15,000 blue units per millilitre; Davitamon D is supplied in oily solution containing 5000 units per millilitre; Davitamon A and D contains these quantities of both vitamins per millilitre. Davitamon tablets contain 500 units of vitamin D, 0·02 gramme of reduced iron and 0·0002 gramme of copper carbonate. (*Organon Laboratories, London.*)

Decholin.—Dehydrocholic acid, supplied in the form of tablets containing 0·25 gramme or in ampoules containing 10 millilitres of a 20 per cent. solution of the sodium salt. It is administered orally or intravenously in the treatment of hepatic diseases. (*Riedel-de Haen, Berlin; Old Strand Chemical and Drug Co., London.*)

Degalol.—*m*-Dihydroxycholic acid supplied in the form of tablets containing 0·1 gramme. It is used in the treatment of cholelithiasis. (*Riedel-de Haen, Berlin; Old Strand Chemical and Drug Co., London.*)

Dekrysil.—4 : 6-Dinitro-*o*-cresol. It is supplied in capsules containing 0·05 gramme for administration in doses of 0·0005 to 0·001 gramme per kilogram body weight in the treatment of obesity by metabolic acceleration. (*British Colloids, London.*)

Dermatol.—Brand of Bismuthi Subgallas. (*Bayer Products, London.*)

Dettol.—Halogen derivative of xylenol dissolved in a saponified mixture of aromatic oils. It is used as a non-toxic and non-irritant germicide. (*Reckitt and Sons, Hull.*)

Dextrosol.—Brand of Dextrosum. (*Corn Products, London.*)

Diagnothorine.—25 per cent. suspension of colloidal thorium oxide. It is administered orally for the X-ray visualisation of the mucous membrane of the œsophagus, stomach, and duodenum. (*May and Baker, London.*)

Dial.—Brand of Allobarbitonum. (*Ciba, London.*)

Dialacetin.—Combination of Dial, 1½ grains, and allyl-*p*-acetaminophenol, 4 grains, in tablet form. It is used as a sedative in the treatment of dysmenorrhœa and febrile conditions. (*Society of Chemical Industry, Basle; Clayton Aniline Co., London.*)

Diarsenol.—Brand of Arsphenamina. (*Diarsenol Co., Buffalo.*)

Di-cituriu.—Mono-potassium diacetylcitrate in tablet form. It is administered in doses of 2 to 6 tablets in the treatment of hypertension. (*Paines and Byrne, London.*)

Dicodid.—Dihydrocodeinone, $C_{18}H_{21}NO_3$, a substitute for morphine and codeine. It is administered by the mouth in doses of 0·005 gramme (1/12 grain) of the bitartrate as a sedative in the treatment of cough and affections of the respiratory organs. It may also be administered by subcutaneous injection of the hydrochloride in doses of 0·015 gramme (¼ grain) as an analgesic. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Didial.—Combination of Dial, 1½ grains, and ethylmorphine diallylbarbiturate, ¼ grain, in tablet form. It is administered as a powerful hypnotic in the treatment of severe insomnia. (*Ciba, London.*)

Digalen.—Preparation of the total glycosides of digitalis supplied in various forms for administration by the mouth or by injection. (*Hoffman-La Roche, London.*)

Digifoline.—Preparation of the total glycosides of digitalis supplied in the form of tablets and ampoules, containing in each the equivalent of 1½ grains of powdered digitalis, or in solution containing the same equivalent in 1 millilitre. (*Ciba, London.*)

Digifortis.—Fat-free, physiologically standardised tincture of digitalis, 25 per cent. stronger than the pharmacopœial tincture; it is also available in the form of tablets of dried leaf. (*Parke Davis, London.*)

Diginutin.—Solution of the total glycosides of digitalis, containing in 1 millilitre the equivalent of 0·1 gramme of powdered digitalis. (*Burroughs Wellcome, London.*)

Digipuratum.—Standardised preparation of digitalis for administration by the mouth or by injection. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Digitaline, Nativelle.—Preparation containing digitalis glycosides, available in the form of granules, ampoules or solutions. It is used for the same purposes as Digitoxinum. (*Nativelle, Paris; Wilcox Jozeau, London.*)

Digitol.—Fat-free, biologically standardised tincture of digitalis. (*Sharp and Dohme, London.*)

Digitos.—Preparation containing the water-soluble active constituents of digitalis leaves. It is administered intramuscularly or intravenously in doses of 0·3 to 4 millilitres (5 to 60 minims). (*Sharp and Dohme, London.*)

Dilaudid.—Dihydromorphinone hydrochloride, $C_{17}H_{19}O_3N,HCl$. It is used as a substitute for morphine in doses of 0·0012 to 0·0025 gramme ($\frac{1}{50}$ to $\frac{1}{25}$ grain) by the mouth, or 0·002 gramme ($\frac{1}{32}$ grain) by subcutaneous injection. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Dimol.—Dimethylmethoxyphenol, with tri- and tetra-methylphenols. It is administered in the form of tablets or syrup as an intestinal antiseptic, and also used externally in various forms as an antiseptic. (*Dimol Laboratories, London; Sangers, London.*)

Diocaine.—*p*-Diallyloxyethyldiphenyldiamidine hydrochloride. It is used in 0·2 to 0·5 per cent. aqueous solution as a local anæsthetic in ophthalmology. (*Ciba, London.*)

Dionin.—Brand of Æthylmorphinæ Hydrochloridum. (*Merck, Darmstadt; Napp, London.*)

Diplosal.—Salicylsalicylic acid, $C_6H_4OH{\cdot}COOC_6H_4{\cdot}COOH$. It occurs as colourless, tasteless crystals, insoluble in water and acids, soluble in alkalis, and is administered in doses of 1 gramme (15 grains) as an anti-rheumatic. (*Boehringer, Mannheim; Mertens, London.*)

Dismenol.—Mixture of equal parts of amidopyrine and *p*-sulphamidobenzoic acid in the form of tablets containing 0·15 gramme of each constituent. It is administered in the treatment of dysmenorrhœa. (*Madlener-Gavin, Genf; Roberts, London.*)

Disulphamin.—Combination of dimethylamidoantipyrine camphorate, sodium nucleinate and hexaminesulphosalicylic acid. It is used in solution, either internally in doses of 0·5 gramme (7½ grains), or as a douche or gargle, in the treatment of influenza and other infections. (*Biochemical Laboratories, Locarno; Coates and Cooper, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Diuretin.—Brand of Theobromina et Sodii Salicylas. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Dmelcos.—Stabilised vaccine prepared from various strains of the Ducrey bacillus for intravenous injection in the treatment of syphilis. (*May and Baker, London.*)

Dormigene.—Monobrom*iso*valerylurea. It is administered as a sedative and hypnotic in doses of 5 to 15 grains. (*Allen and Hanburys, London.*)

Drikold.—Brand of solid carbon dioxide. (*Imperial Chemical Industries, London.*)

Duotal.—Brand of Guaiacolis Carbonas. (*Heyden, Dresden; Braun, London.*)

E.D.P.—Surgical dusting powder containing bismuth formic iodide. (*Evans Sons Lescher and Webb, Liverpool.*)

Edwenil.—Antibacterial element from normal serum in sterile solution for subcutaneous injection. It is used as a polyvalent antibacterial agent in the treatment of a number of diseases of bacterial origin. (*Spicer, London.*)

Elbon-Ciba.—Cinnamolyl-*p*-oxyphenylurea in tablet form. It is administered in the treatment of tuberculosis and anaphylactic diseases. (*Ciba, London.*)

Elityran.—Biologically standardised extract of thyroid. It is administered in doses of 0·025 to 0·05 gramme. (*Bayer Products, London.*)

Empirin.—Brand of Acidum Acetylsalicylicum. (*Burroughs Wellcome, London.*)

Enesol.—Mercury salicylarsonate. It is injected hypodermically in the treatment of syphilis, the usual dose being 0·06 gramme (1 grain) dissolved in 2 millilitres (30 minims) of water. (*Sempa, Paris; Mertens, London.*)

Enteromucine.—Preparation of mucin from intestinal mucus. It is administered orally in the treatment of colitis and constipation. (*Robert et Carrière, Paris; Anglo-French Drug Co., London.*)

Entero-Vioform.—Tablets containing 0·25 gramme of Vioform for administration in the treatment of chronic amœbiasis and other parasitic intestinal diseases. (*Ciba, London.*)

Enzymol.—Extract of gastric glands for external application in the treatment of various pyogenic affections. (*Fairchild Bros. and Foster, New York; Burroughs Wellcome, London.*)

Ephetonin.—Brand of synthetically prepared Ephedrina. (*Merck, Darmstadt; Napp, London.*)

Epinine.—3 : 4-Dihydroxyphenylmethylamine. It resembles adrenaline in its action, but is more stable in slightly acid solution. It is used in 1 per cent. solution in the same manner as solution of adrenaline. (*Burroughs Wellcome, London.*)

Erbolin.—Brand of Ergota Præparata in the form of capsules each containing the equivalent of 0·0004 gramme ($\frac{1}{150}$ grain) of the total alkaloids of ergot, calculated as ergotoxine. (*Glaxo Laboratories, London.*)

Ergamine.—Brand of synthetically prepared Histamina. (*Burroughs Wellcome, London.*)

Ergoapiol.—Capsules containing the active principles of ergot and apiol and used in the treatment of menstrual disorders. (*Martin H. Smith, New York; Christy, London.*)

Ergodex.—Liquid extract of ergot containing 0·06 per cent. of the alkaloids of ergot, calculated as ergotoxine. (*British Drug Houses, London.*)

Ergole.—A liquid extract of ergot. (*Oppenheimer, London.*)

Ergothane.—Sterile solution of ergotoxine ethanesulphonate containing 0·0005 gramme per millilitre. (*Evans Sons Lescher and Webb, Liverpool.*)

Substances with Proprietary Trade-Names—*Continued.*

Ernutin.—Solution containing ergotoxine ethanesulphonate with Ergamine and tyramine. It is administered orally as a 0·033 per cent. solution in doses of 2 to 4 millilitres (½ to 1 fluid drachm). For hypodermic or intramuscular injection it is administered as a 0·1 per cent. solution in doses of 0·3 to 0·6 millilitre (5 to 10 minims). (*Burroughs Wellcome, London.*)

Erythgen.—Brand of Extractum Hepatis Siccum, representing 40 times its weight of fresh liver. It is also prepared in solution for hypodermic administration. (*Carnrick, Newark, N.J.; Brooks and Warburton, London.*)

Eschatin.—Brand of Extractum Suprarenali Corticis. (*Parke Davis, London.*)

Essogen (Lever's Preparation Y).—Preparation containing vitamin A, with a blue value of 2000. It is supplied in capsules containing 2 minims. (*Trufood, London.*)

Esterol.—Brand of Benzylis Succinas. (*Stearns, Detroit.*)

Ethidol.—Ethyl iodoricinoleate, containing 20 per cent. of iodine. It does not stain the skin, and is applied externally in the treatment of various inflammations. (*Burroughs Wellcome, London.*)

Eucerin.—Mixture of Eucerin (Anhydrous) with an equal weight of water. (*Beiersdorf, Welwyn Garden City.*)

Eucerin (Anhydrous).—Mixture of 95 parts of a paraffin ointment with 5 parts of oxycholesterins from wool fat. (*Beiersdorf, Welwyn Garden City.*)

Eucodeine.—Codeine methylbromide. It is administered orally instead of codeine in doses of 0·05 gramme (¾ grain). (*Boehringer, Mannheims; Mertens, London.*)

Eucortone.—Brand of Extractum Suprarenali Corticis. (*Allen and Hanburys, London.*)

Eucupin.—Brand of *iso*Amylhydrocupreinæ Hydrochloridum. (*Zimmer, Mannheim; Pharmaceutical Products, London.*)

Eugallol.—Pyrogallol monoacetate. It is applied locally, either undiluted or diluted with acetone, in the treatment of psoriasis and other skin diseases. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Eugastrol.—Brand of Ventriculus Desiccatus. (*Allen and Hanburys, London.*)

Eukodal.—Dihydroxycodeinone hydrochloride, $C_{18}H_{21}NO_4$,HCl. It occurs as a white, crystalline powder which is soluble in water. It is administered as a substitute for morphine, in doses of 0·005 gramme (1/12 grain) by the mouth, or of 0·01 to 0·02 gramme (⅙ to ⅓ grain) by subcutaneous injection. (*Merck, Darmstadt; Napp, London.*)

Euparatone.—Biologically standardised solution of the parathyroid hormone. (*Allen and Hanburys, London.*)

Eupaverin.—Synthetic alkaloid obtainable as the hydrochloride and as the sulphate. It is used for the same purposes as Papaverina. (*Merck, Darmstadt; Napp, London.*)

Eupepton.—Brand of Peptonum, prepared in two forms; No. 1 is for non-specific protein therapy and for the Rideal-Walker test; No. 2 is for general bacteriological purposes. (*Allen and Hanburys, London.*)

Euphthalmin (Eucatropine).—Hydrochloride of phenylglycolyl-N-methylvinyl-diacetonalkamine. It is used in 5 to 10 per cent. solution in water as a mydriatic. (*Schering, London.*)

Euphyllin.—Theophylline ethylenediamine, containing about 80 per cent. of theophylline. It is used as a diuretic, particularly in the treatment of œdema of cardiac origin or when complicated by arteriosclerosis. It is administered orally, rectally, intravenously, or intramuscularly, and is supplied in the form of tablets containing 0·1 gramme (1½ grains), suppositories containing 0·36 gramme (5½ grains), or ampoules containing 0·48 gramme (7½ grains) in 2 millilitres. (*Whiffen, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Eupinal.—Preparation containing iodide of caffeine administered in the treatment of asthma. (*Cuxson Gerrard, Oldbury.*)

Eupnine Vernade.—Preparation containing 7½ grains of caffeine iodide in each fluid drachm administered in the treatment of asthma. (*Darrasse, Nanterre; Wilcox Jozeau, London.*)

Euquinine.—Brand of Quininæ et Æthylis Carbonas. (*Zimmer, Mannheim.*)

Euresol.—Brand of Resorcinolis Monoacetas. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Euresol pro Capillis.—Perfumed form of Euresol for use in hair preparations. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Eusolvan.—Brand of Æthylis Lactas. (*Schering, London.*)

Euvalerol.—Odourless preparation of valerian supplied either plain or with the addition of phenobarbitone (2 grains per fluid ounce) or of ammonium and strontium bromides. (*Allen and Hanburys, London.*)

Evipan.—N-methyl-C-C-cyclohexenylmethylmalonylurea in tablet form. It is administered in doses of 0·25 to 0·5 gramme (4 to 8 grains) or more, in the treatment of insomnia. (*Bayer Products, London.*)

Evipan Sodium.—Sodium derivative of Evipan. It is used for the immediate production of anæsthesia of short duration. It is administered by intravenous injection as a freshly prepared 10 per cent. aqueous solution in doses of 7 to 10 millilitres. (*Bayer Products, London.*)

Exhepa.—Brand of Extractum Hepatis Siccum. (*Bencard, London; Woolley, Manchester.*)

Extomak.—Brand of Ventriculus Desiccatus. (*Benger, Manchester.*)

Fæxalin.—Preparation of dried beer yeast for internal administration in the treatment of skin affections. (*Temmler, Berlin; Coates and Cooper, London.*)

Felamine.—Hexamine with cholic acid in tablet form, administered in the treatment of hepatic and allied diseases. (*Sandoz, London; Brooks and Warburton, London.*)

Felsol.—Powders containing phenazone, iodopyrine, caffeine and other ingredients for use in the treatment of asthma. (*British Felsol, London.*)

Femergin.—Brand of Ergotaminæ Tartras. (*Sandoz, London; Brooks and Warburton, London.*)

Ferarin.—Solution of green iron and ammonium citrate with the addition of a soluble form of arsenic. It is administered by intramuscular injection for the same purposes as Injectio Ferri et Arseni. (*Squire, London.*)

Ferronyl.—Tablets containing 0·05 gramme of ferrous chloride, used in the treatment of anæmia. (*Norgine, Prague; Napp, London.*)

Ferrophytin.—Neutral iron salt of inositol hexaphosphoric acid, containing 7·5 per cent. of iron and 6 per cent. of phosphorus. It is administered in the form of pills containing the equivalent of ⅛ grain of iron in the treatment of anæmia. (*Ciba, London.*)

Fibrolysin.—Solution of thiosinamine and sodium salicylate. (*Merck, Darmstadt; Napp, London.*)

Filivex.—Liquid extract of fish livers, each fluid ounce being equivalent to 4 ounces of fresh mammalian liver. It is also available in the form of powder. (*Glaxo Laboratories, London.*)

Filmarone Oil.—10 per cent. solution of filmarone in a neutral vegetable oil, for use as a vermifuge. (*Boehringer, Mannheim; Mertens, London.*)

Fortossan.—Mixture of Phytin and lactose in powder form. (*Ciba, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Fotamilko.—Barium sulphate, mixed with dried milk and flavoured with lemon, for administration as a fluid barium meal. Fotamealo is a cocoa-flavoured barium meal containing tragacanth as suspending agent. Fotonemal is a slightly flavoured barium sulphate powder for administration in water or other vehicle. (*Evans Sons Lescher and Webb, Liverpool.*)

Gardan.—Combination of Pyramidon and Novalgin in tablet form. It is administered in doses of 0·3 to 0·6 gramme (5 to 10 grains). (*Bayer Products, London.*)

Gardenal.—Brand of Phenobarbitonum. (*May and Baker, London.*)

Gardenal Sodium.—Brand of Phenobarbitonum Solubile. (*May and Baker, London.*)

Gaster Siccata.—Brand of Ventriculus Desiccatus. (*British Drug Houses, London.*)

Gastrexo.—Brand of Ventriculus Desiccatus. (*Evans Sons Lescher and Webb Liverpool.*)

Gastrosic.—Brand of Ventriculus Desiccatus. (*Bencard, London; Woolley, Manchester.*)

Genasprin.—Brand of Acidum Acetylsalicylicum in tablet form. (*Genatosan Loughborough.*)

Genoscopolamine.—Nitrogen oxide of scopolamine. It has a marked action on the central nervous system and is employed in the treatment of Parkinsonism. It is supplied in granules, ampoules or in solution and is administered in doses of 0·0005 gramme ($\frac{1}{120}$ grain) two or three times daily. (*Laboratoires Amido, Lille; Wilcox Jozeau, London.*)

Germanin (Bayer 205).—Complex organic urea administered in the treatment of trypanosomiasis as a 10 per cent. aqueous solution in doses of up to 10 millilitres by subcutaneous or intravenous injection. (*Bayer Products, London.*)

Glanduantin.—Preparation containing the anterior pituitary sex hormone. (*Richter, London.*)

Glandubolin.—Brand of ketohydroxyoestrin (see Oestrinum). (*Richter, London.*)

Glanduitrin.—Brand of Extractum Pituitarii Liquidum. (*Richter, London.*)

Glanduovin.—Extract of the whole ovarian substance. (*Richter, London.*)

Glaucosan (Dextro-Glaucosan).—Solution containing 0·2 per cent. of synthetic *d*-adrenaline and 1 per cent. of methylaminoacetocatechol (adrenalone). It is administered by sub-conjunctival injection in the treatment of glaucoma. (*Wülm, Spangenberg; Saccharin Corporation, London.*)

Glauramine.—Concentrated solution of auramine in glycerin and alcohol. (*British Drug Houses, London.*)

Globenil.—Polyvalent antibody experimentally administered by injection in the treatment of inoperable malignant disease. (*Spicer, London.*)

G. L. Preparation-A.—Vitamin A concentrate, free from vitamin D, containing 240,000 units of vitamin A per millilitre. It is also available in capsules containing 3 minims. (*Glaxo Laboratories, London.*)

Glukhorment.—Preparation of the pancreas with a guanidine derivative. It is used as a substitute for insulin in the treatment of certain mild cases of diabetes. (*Horment, Berlin.*)

Gomenol.—Distilled essence of *Melaleuca Viridiflora* having antiseptic properties. It is used internally and externally in various forms as an antiseptic. (*Laboratoire des Produits du Gomenol, Paris; Coates and Cooper, London.*)

Gorun.—Combination of cinchophen, hexamine and glycocoll supplied in the form of solution in ampoules for injection, or of cachets for oral administration, in the treatment of rheumatism and sciatica. (*Jacubson, Charlottenburg; Pharmaceutical Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Guipsine.—Preparation containing the constituents of mistletoe and administered in the form of pills in the treatment of arteriosclerosis. (*Leprince, Paris; Bengué, London.*)

Gynœstryl.—Brand of ketohydroxyoestrin (see Oestrinum). It is supplied in solution containing 1000 units per millilitre for oral administration or in ampoules for injection. (*Laboratoire Français de Chimiothérapie, Paris; Anglo-French Drug Co., London.*)

Halarsol.—3-Amino-4-hydroxyphenyldichlorarsine hydrochloride. It is prepared in 2·5 per cent. solution for intravenous injection in the treatment of yaws. (*May and Baker, London.*)

Halibol.—Brand of Oleum Hippoglossi with added vitamin D, containing 600 units of vitamin A (blue value) and 10,000 units of vitamin D per gramme. (*Allen and Hanburys, London.*)

Haliverol.—Brand of Oleum Hippoglossi adjusted to contain a vitamin A potency of 60 times that of cod-liver oil and a vitamin D potency of 250 times that of cod-liver oil. (*Parke Davis, London.*)

Hebaral Sodium.—Sodium *n*-hexylethylbarbiturate administered in capsules as a sedative and hypnotic in doses of 3 grains. (*Parke Davis, London.*)

Hectargyre.—Combination of Hectine with mercury. (*Mouneyrat, Villeneuve-la-Garenne; Anglo-French Drug Co., London.*)

Hectine.—Sodium benzosulpho-*p*-aminophenylarsonate, administered by intramuscular injection or by the mouth in the treatment of syphilis. (*Mouneyrat, Villeneuve-la-Garenne; Anglo-French Drug Co., London.*)

Hegonon.—Organic compound of silver and albumose containing 7 per cent. of silver. It is used for the same purposes as Argenti Proteinas. (*Schering, London.*)

Helmitol.—Brand of Formamol. (*Bayer Products, London.*)

Hemoplastin.—A serum containing prothrombin and thrombokinase derived chiefly from the blood of horses and cattle. It is administered by subcutaneous or intramuscular injection or orally for the control of hæmorrhage. (*Parke Davis, London.*)

Hemoprotein.—A 10 per cent. solution of a protein fraction, obtained from blood fibrin by digestion with pepsin and fractional precipitation, and used for non-specific protein therapy. (*Parke Davis, London.*)

Hemostyl.—Fresh hæmopoietic horse serum. It is administered by the mouth in the treatment of anæmias and hæmorrhages. (*Institut de Serothérapie Hémopoietique, Paris; Bengué, London.*)

Hemypnone.—Preparation of diamorphine diallylbarbiturate and chlorbutol, supplied in the form of tablets or suppositories for use in the induction of "twilight sleep." The tablets contain the equivalent of $\frac{3}{16}$ grain of Dial, with $\frac{1}{8}$ grain of ethylmorphine and $7\frac{1}{2}$ grains of chlorbutol; the suppositories contain the equivalent of $\frac{1}{3}$ grain of Dial, $\frac{1}{2}$ grain of ethylmorphine and $9\frac{1}{2}$ grains of chlorbutol. (*Ciba, London.*)

Hepa Simplex.—Brand of liver extract. (*Bencard, London; Woolley, Manchester.*)

Hepastab.—Concentrated sterile solution of the anti-anæmic principles of mammalian liver. It is administered by intramuscular injection in doses of 2 or more millilitres. (*Boots, Nottingham.*)

Hepatex.—Preparation similar to Extractum Hepatis Liquidum, one fluid drachm being equivalent to 2 ounces of fresh liver. Modifications for administration by intramuscular or intravenous injection and compounded preparations are also available. (*Evans Sons Lescher and Webb, Liverpool.*)

Substances with Proprietary Trade-Names—*Continued.*

Hepol.—Extract of liver for oral administration. Modifications for administration by intramuscular or intravenous injection and compounded preparations are also available. (*Allen and Hanburys, London.*)

Hexal.—Hexamine sulphosalicylate in tablet form. It is used for the same purposes as hexamine in doses of 0·5 to 1 gramme (8 to 15 grains). (*Riedel-de Haen, Berlin; Old Strand Chemical and Drug Co., London.*)

Hogastrin.—Liquid extract of freshly killed hogs' stomach for the treatment of pernicious anæmia. It is administered in doses of 1 to 2 fluid drachms. (*Giles Schacht, Bristol.*)

Hoggex.—Preparation of the desiccated mucous membrane of hogs' stomach containing the anti-anæmic principle. It is administered in doses of one-quarter those of desiccated whole stomach, and is supplied in capsules containing the equivalent of 1200 grains of whole fresh stomach. (*Paines and Byrne, London.*)

Holadin.—Extract of pancreas containing diastasic enzymes. (*Fairchild, Bros. and Foster, New York; Burroughs Wellcome, London.*)

Hombreol.—Biologically standardised preparation of the testicular hormone for administration by intramuscular injection in doses of 1 millilitre in the treatment of conditions arising from impaired internal secretion from the testes. (*Organon Laboratories, London.*)

Hordine.—Brand of Extractum Malti Liquidum. (*Oppenheimer, London.*)

Hydnocreol.—Preparation consisting of the ethyl esters of the fatty acids of hydnocarpus oil with 4 per cent. of creosote. (*Smith, Stanistreet, Calcutta.*)

Hydropyrin.—Brand of Lithii Acetylsalicylas. (*Richter, London.*)

Hyperol.—Solid compound of urea and hydrogen peroxide, stabilised with citric acid, containing the equivalent of 35 per cent. of H_2O_2. It is supplied in powder or in tablets containing 1 gramme (15 grains). (*Richter, London; Berk, London.*)

Hypophysin.—Brand of Extractum Pituitarii Liquidum. (*Bayer Products, London.*)

Ichthalbin.—Compound of ichthammol and albumen. It is administered in cachets containing 1 gramme (15 grains) in the treatment of chronic intestinal disorders, and in eczema and other skin affections. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Ichthargen.—Silver compound of Ichthyol containing 30 per cent. of silver. It is used in solution in the treatment of gonorrhœa. (*Cordes, Hermanni, Hamburg; Ichthyol Co., London.*)

Ichthoform.—Condensation product of ichthammol and formaldehyde. It is administered as an intestinal antiseptic in doses of 0·1 to 0·3 gramme (1½ to 5 grains). (*Cordes, Hermanni, Hamburg; Ichthyol Co., London.*)

Ichthyol.—Brand of Ichthammol. (*Cordes, Hermanni, Hamburg; Ichthyol Co., London.*)

Idozan.—Solution containing 5 per cent. of colloidal iron, administered in doses of 1 to 4 fluid drachms. (*Serpens, Copenhagen; Coates and Cooper, London.*)

Iglodine.—Triiodoethylphenol. It is supplied in numerous forms for use as an antiseptic. (*Iglodine, Newcastle-on-Tyne.*)

Impletol.—Compound of diethyl-*p*-aminobenzoyl hydrochloride and caffeine. It is administered by subcutaneous or intramuscular injection for the relief of pain due to vasomotor disturbances. (*Bayer Products, London.*)

Infundibulin.—Brand of Extractum Pituitarii Liquidum. (*Evans Sons Lescher and Webb, Liverpool.*)

Substances with Proprietary Trade-Names—*Continued.*

Infundin.—Brand of Extractum Pituitarii Liquidum. (*Burroughs Wellcome, London.*)

Infundrenalin.—Combination of Infundibulin and adrenaline. It is supplied in two ampoules, the contents of which are mixed prior to administration, and is administered by hypodermic injection in doses of 0·5 to 1 millilitre for the relief of bronchial asthma and hay fever. (*Evans Sons Lescher and Webb, Liverpool.*)

Iodalbin.—An iodoprotein containing about 21·5 per cent. of iodine. It is administered in doses of 0·3 gramme (5 grains) or more as a substitute for inorganic iodides. (*Parke Davis, London.*)

Iodatol.—Iodised vegetable oil prepared in various strengths and administered in place of inorganic iodides. The 40 per cent. strength is used for X-ray visualisation. (*British Drug Houses, London.*)

Iod-Calcium-Diuretin.—Combination of potassium iodide and Calcium-Diuretin used in the treatment of angina pectoris and asthma. It is supplied as powder, or in tablets containing 1½ grains of potassium iodide and 7½ grains of Calcium-Diuretin. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Iodeikon.—Brand of Iodophthaleinum. (*Mallinckrodt, St. Louis.*)

Iodex.—A non-staining ointment containing 4 per cent. of iodine. (*Menley and James, London.*)

Iodicin.—Calcium salt of iodoricinoleic acid. It is administered in place of inorganic iodides in the form of capsules containing 0·2 gramme (3 grains) equivalent to about 1 grain of iodine, or in the form of tablets with a chocolate base containing 0·03 gramme (½ grain) equivalent to about ⅛ grain of iodine. (*Burroughs Wellcome, London.*)

Iodipin.—Iodised sesame oil prepared in various strengths and administered by the mouth or by intramuscular injection as a substitute for inorganic iodides. The 40 per cent. preparation is used as a contrast medium in X-ray diagnosis. (*Merck, Darmstadt; Napp, London.*)

Iodival.—α-Monoiodo*iso*valerylcarbamide. It is a sedative compound of iodine for internal administration in doses of 0·3 gramme (5 grains). (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Iodolysin.—Compound containing thiosinamine, 43 per cent., and iodine, 47 per cent. It is administered by injection, by the mouth and by local application in the treatment of rheumatoid arthritis. (*Allen and Hanburys, London.*)

Iodoprotein.—Preparation containing about 10 per cent. of iodine. It is administered in the form of tablets containing 0·3 gramme (5 grains) or 0·6 gramme (10 grains) in place of inorganic iodides. (*Martindale, London.*)

Iodo-Ray.—Brand of Iodophthaleinum. (*Martindale, London.*)

Iodostarin.—Iodine derivative of tariric acid containing about 47·5 per cent. of iodine. It is used in the form of tablets as a substitute for inorganic iodides. (*Hoffman-La Roche, London.*)

Iodsam.—Iodised oil containing 10 per cent. of iodine. It is administered in place of inorganic iodides, and is also supplied as an ointment containing 10 per cent. of iodine. (*Oppenheimer, London.*)

Iod-Tetragnost.—Brand of Iodophthaleinum. (*Merck, Darmstadt; Napp, London.*)

Ipecopan.—Preparation containing 0·0025 gramme ($\frac{1}{27}$ grain) of the total alkaloids of opium and 0·0005 gramme ($\frac{1}{135}$ grain) of emetine hydrobromide in tablet form. Each tablet is equivalent to 0·3 gramme (5 grains) of compound powder of ipecacuanha. (*Sandoz, London; Brooks and Warburton, London.*)

Isacen.—Diacetyldioxyphenylisatin. It is administered in the form of granules in the treatment of constipation. (*Hoffman-La Roche, London.*)

Substances with Proprietary Trade-Names—*Continued.*

I-so-gel.—Preparation consisting of a dried mucilage from vegetable seeds and used for the same purposes as Psyllium. (*Allen and Hanburys, London.*)

Iso-Iodeikon.—Sodium phenoltetraiodophthalein. It is administered by intravenous injection for the X-ray visualisation of the gall-bladder and simultaneous test of hepatic function. It may be given orally if X-ray visualisation of the gall-bladder alone is required. (*Mallinckrodt, St. Louis.*)

Isolax.—Diphenolisatin in the form of tablets containing 0·0005 gramme. It is administered in the treatment of constipation. (*Richter, London.*)

Istin.—Dihydroxyanthraquinone in the form of tablets containing 0·15 gramme (2½ grains) for use in the treatment of constipation. (*Bayer Products, London.*)

Jothion.—1 : 3-diiodopropane-2-ol, containing from 77 to 80 per cent. of iodine. It is used to obtain the systemic effects of iodine by external application. (*Bayer Products, London.*)

Kafalgol.—Combination of caffeine, 0·05 gramme, and calcium acetylsalicylate, 0·5 gramme, in tablet form. (*Richter, London.*)

Kalmopyrin.—Brand of Calcii Acetylsalicylas. (*Richter, London.*)

Kaltron.—Polyvalent vaccine administered by injection in doses of 0·5 to 1 millilitre (8 to 15 minims) in the prophylactic treatment of colds, influenza and catarrh. (*Bayer-Meister Lucius, Leverkusen; Saccharin Corporation, London.*)

Kalzana.—Tablets containing 0·5 gramme (7½ grains) of calcium sodium lactate. (*Therapeutic Products, London.*)

Karvol.—Chlorocarvacrol in 5 per cent. solution for use as an antiseptic. (*British Colloids, London.*)

Kathiolan.—An ointment used for the same purposes as Unguentum Potassii Polysulphidi. (*Ferrosan, Copenhagen; C. Zimmermann, London.*)

Kelene.—Brand of Æthylis Chloridum. (*Société Parisienne d'Expansion Chimique, Paris.*)

Kerocain.—Brand of Procainæ Hydrochloridum. (*Kerfoot, Bardsley.*)

Kharophen.—Brand of Acetarsol. (*Burroughs Wellcome, London.*)

Kharsivan.—Brand of Arsphenamina. (*Burroughs Wellcome, London.*)

Kharsulphan.—Brand of Sulpharsphenamina. (*Burroughs Wellcome, London.*)

Kinectine.—Combination of Hectine and quinine hydrochloride in tablet form for administration in the treatment of hay fever, malaria and influenza. (*Mouneyrat, Villeneuve-la-Garenne; Anglo-French Drug Co., London.*)

Koptalgos.—De-narcotised preparation of opium containing 0·0375 per cent. of morphine. It is administered in doses of 0·3 to 2·5 millilitres (5 to 40 minims) in place of the tincture. (*Duncan Flockhart, Edinburgh.*)

Krysolgan.—Sodium salt of 4-amino-2-auromercaptolbenzol-1-carboxylic acid. It is given intravenously in gradually increasing doses from 0·0001 to 0·05 gramme ($\frac{1}{600}$ to $\frac{3}{4}$ grain) in the treatment of tuberculosis. (*Schering, London.*)

Lacarnol.—Extract of heart muscle prepared for oral or intramuscular administration in the treatment of angina pectoris. (*Bayer Products, London.*)

Lactéol.—Preparations containing lactic acid-forming bacilli in various forms for internal and external use. (*Boucard, Paris; Wilcox Jozeau, London.*)

Lactobacilline.—Preparation containing lactic acid-forming bacilli. (*Darasse, Nanterre; Wilcox Jozeau, London.*)

Lævo-Glaucosan.—Solution containing 2 per cent. each of synthetic *l*-adrenaline and of active methylaminoacetocatechol (adrenalone). It is a powerful miotic used in the form of eye-drops, preceded by a local anæsthetic, in the treatment of chronic glaucoma. (*Wälm, Spangenberg; Saccharin Corporation, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Laxase.—Brand of Agar in tablet form. (*Allen and Hanburys, London.*)

Laxoin.—Brand of Phenolphthaleinum. (*Oppenheimer, London.*)

Lemolac.—Brand of Hydrargyri Subchloridum in a very light form. (*Howards, Ilford.*)

Lenigallol.—Pyrogallol triacetate. It is used as an ointment, containing from 1 to 10 per cent., the strength being gradually increased, in the treatment of eczema. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Levurine.—Preparation of dried beer yeast. It is administered by the mouth or by intramuscular injection in the treatment of staphylococcal infections. (*Couturieux, Paris; Wilcox Jozeau, London.*)

Lipamin.—Preparation of the hormone of the corpus luteum similar in effect to oestrin. It is administered orally or by injection in the treatment of amenorrhœa and allied conditions. (*Paines and Byrne, London.*)

Lipiodol.—Iodised poppyseed oil. It contains 10 or 40 per cent. of iodine in organic combination and is used as a contrast medium in X-ray diagnosis. (*Guerbet, Paris; Bengué, London.*)

Lipoiodine-Ciba.—Ethyl ester of diiodobrassidic acid containing 41 per cent. of iodine. It is administered orally in the form of tablets in doses of 0·3 to 2 grammes (5 to 30 grains) in place of inorganic iodides. (*Ciba, London.*)

Lipo-Lutin.—Protein-free extract containing the lipoids of the corpus luteum. (*Parke Davis, London.*)

Litmopyrin.—Brand of Lithii Acetylsalicylas. (*Bishop, London.*)

Livadex.—Concentrated liquid extract of liver containing in 1 fluid ounce the active principles of 8 ounces or raw liver. (*British Drug Houses, London.*)

Liver Extract Fraction A5.—A fraction of liver extract for oral administration containing the anti-anæmic principle, and representing about 20 times its weight of fresh liver. (*Sharp and Dohme, London.*)

Liveroid.—Brand of liquid extract of liver, flavoured for oral administration. (*Oxo, London.*)

Livogen.—A liquid preparation containing in each fluid ounce the active principles of 4 ounces of fresh liver and 1 ounce of fresh yeast, with 5 grains of hæmoglobin. It is administered in the treatment of anæmia and debility. (*British Drug Houses, London.*)

Livron.—Compound liver extract containing iron for use in the treatment of secondary anaemias. (*Boots, Nottingham.*)

Lodal.—Chloride of 6:7-dimethoxy-2-methyl-3:4-dihydro*iso*quinolinium, used like cotarnine and hydrastinine to control uterine haemorrhage. (*Burroughs Wellcome, London.*)

Loretin.—Iodoxyquinolinesulphonic acid mixed with sodium bicarbonate. It occurs as a yellow powder soluble in water and is administered as an antiseptic, particularly in the treatment of amœbic dysentery, in doses of 1 gramme (15 grains) three times a day. It may also be administered by rectal injection of 200 millilitres of a 2 per cent. solution. (*Schuchardt, Gorlitz.*)

Lorol.—A mixture of alcohols obtained by the hydrogenation of the fatty acids of certain fixed oils. The sodium salts of sulphonates of the alcohols (Sulphonated Lorol) are used widely as detergents. (*Ronschein and Moore, London.*)

Luminal.—Brand of Phenobarbitonum. (*Bayer Products, London.*)

Luminal Sodium.—Brand of Phenobarbitonum Solubile. (*Bayer Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Luteolipoids.—Preparation of the hormone of the corpus luteum which is antagonistic to oestrin. It is administered orally or by injection in the treatment of menorrhagia and allied conditions. (*Paines and Byrne, London.*)

Lycetol.—Dimethylpiperazine tartrate. It is given in doses of 8 to 30 grains in the treatment of gouty and rheumatic conditions. (*Bayer Products, London.*)

Magisal.—Brand of Magnesium Acetylsalicylate. (*Martindale, London.*)

Magnesium-Perhydrol.—Brand of Magnesii Peroxidum (15 or 20 per cent. of MgO_2). (*Merck, Darmstadt; Napp, London.*)

Magnozon.—Brand of Magnesii Peroxidum (25 per cent. of MgO_2). (*Richter, London.*)

Marmite.—Extract of yeast containing the vitamin B complex. (*Marmite Food Extract Co., London.*)

Mastisol.—Compound solution containing mastic in benzene. It is used as an application to wounds. (*Schubert, Berlin.*)

Matronax.—Compound tablet containing ½ grain of ovarian substance with Thyraden, Bromural and Calcium-Diuretin. It is administered in the treatment of affections associated with the menopause. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Medinal.—Brand of Barbitonum Solubile. (*Schering, London.*)

Menformon.—Brand of ketohydroxyoestrin (see Oestrinum). It is supplied in the form of tablets of various strengths for oral administration, in aqueous solution containing 0·0001 gramme (1000 Doisy rat units) per millilitre, in oily solution containing 10,000 units per millilitre, or in the form of suppositories containing 1000 units. (*Organon Laboratories, London.*)

Mercolloid.—Suspension of colloidal mercuric sulphide for intramuscular injection in the treatment of syphilis. (*Biochemical Laboratories, Locarno; Coates and Cooper, London.*)

Mercurocol.—Brand of Mercurochromum. (*Evans Sons Lescher and Webb, Liverpool.*)

Mercurome.—Brand of Mercurochromum. (*Martindale, London.*)

Meroxyl.—Mixture containing about 50 per cent. of the sodium salt of 2 : 4-dihydroxy-3 : 5-dihydroxymercuribenzophenone-2′-sulphonic acid. It is used as an antiseptic for the irrigation of wounds, as a wet dressing (1 in 1000), and for prophylactic use in the genito-urinary tract (1 in 200). (*Hynson, Westcott and Dunning, Baltimore.*)

Mesotan.—Methoxymethyl salicylate, $C_6H_4(OH)\cdot COO\cdot CH_2OCH_3$. It is used in the form of a paint, diluted with 1 to 4 parts of olive or other oil, as a counter-irritant. (*Bayer Products, London.*)

Mesurol.—Basic bismuth methoxyhydroxybenzoate. It is administered intramuscularly as a 20 per cent. emulsion in the treatment of syphilis. (*Bayer Products, London.*)

Metagen.—Preparation containing water-soluble and fat-soluble vitamins in extract form. (*Parke Davis, London.*)

Metaphen.—4-Nitro-3 : 5-*bis*acetoxymercuri-2-cresol. It occurs as an odourless and tasteless powder insoluble in water but readily soluble in dilute alkalis. It is used as a non-irritant antiseptic in strengths of from 1 to 10,000 to 1 in 1000. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Metarsenobillon.—Brand of Sulpharsphenamina. (*May and Baker, London.*)

Methyl Adronol.—Brand of Methylcyclohexanolum. (*Bayer Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Methyl-Aspriodine.—Methyl acetyliodosalicylate,. It occurs as a white, crystalline compound melting at 40° and containing the equivalent of 40 per cent. of iodine and 56 per cent. of acetylsalicylic acid. It is applied externally in the form of an ointment or liniment in the treatment of painful rheumatic affections. (*Martindale, London.*)

Metramine.—Brand of Hexamina. (*Oppenheimer, London.*)

Migrainine.—Brand of Phenazoni et Caffeinæ Citras. (*Bayer Products, London.*)

Mitigal.—Dimethyldiphenylenedisulphide, a liquid application for the topical treatment of scabies and other skin affections. (*Bayer Products, London.*)

Moogrol.—Brand of Oleum Hydnocarpi Æthylicum. (*Burroughs Wellcome, London.*)

Moranyl (Fourneau 309).—The symmetrical urea of di-sodium *m*-aminobenzoyl-*m*-amino-*p*-methylbenzoyl-1-naphthylamino-4:6:8-trisulphonate, administered in the treatment of trypanosomiasis as a 10 per cent. aqueous solution in doses up to 10 millilitres by subcutaneous or intravenous injection. (*Societe Parisienne d'Expansion Chimique, Paris.*)

Multibral.—Sodium monobromoleate in the form of coated pellets. It is administered as a substitute for bromides. (*Norgine, Prague; Napp, London.*)

Mycosin.—Brand of desiccated yeast. (*Richter, London.*)

Myocrisin.—Preparation of gold sodium thiomalate administered by intramuscular injection for the same purposes as Auri et Sodii Thiosulphas. (*May and Baker, London.*)

Myosalvarsan.—Brand of Sulpharsphenamina. (*Bayer Products, London.*)

Myoston.—Preparation of heart muscle extract for administration by subcutaneous or intramuscular injection, or orally, in the treatment of angina pectoris. (*Henning, Berlin; Pharmaceutical Products, London.*)

Narcophin.—Morphine narcotine meconate. It occurs as yellowish crystals, containing about 30 per cent. of morphine, incompletely soluble in water. It is administered as a hypnotic in doses of 0·015 to 0·03 gramme (¼ to ½ grain). (*Boehringer, Mannheim; Mertens, London.*)

Narcotile.—Brand of Æthylis Chloridum. (*Bengué, London.*)

Nargol.—Combination of silver with nucleinic acid from yeast, containing 10 per cent. of silver. It may be used in the form of 0·25 to 10 per cent. solution or in bougies containing 1 or 2 per cent. (*Parke Davis, London.*)

Natibaine.—Solution containing digitoxin and ouabain. 15 drops contain $\frac{1}{100}$ grain of Digitaline (Nativelle) and $\frac{1}{300}$ grain of ouabain. It is administered in doses of 10 to 30 drops during twenty-four hours. (*Nativelle, Paris; Wilcox Jozeau, London.*)

Neboline.—Brand of Paraffinum Liquidum Leve. (*Oppenheimer, London.*)

Nembutal.—Sodium ethylmethylbutylbarbiturate. It is administered orally in doses of 0·03 to 0·2 gramme (½ to 3 grains) as a sedative and hypnotic, particularly for pre-operative narcosis. It is also administered intravenously as an anæsthetic. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Neobismosalvan.—Suspension of quinine and bismuth iodide and lecithin in olive oil. It is administered by intramuscular injection in the treatment of syphilis. (*Richter, London.*)

Neo-Bornyval.—*iso*Valerylglycollic ester of borneol. It is administered in the form of perles containing 0·25 gramme (3¾ grains) in the treatment of nervous gastric and other affections. (*Riedel-de Haen, Berlin; Old Strand Chemical and Drug Co., London.*)

Substances with Proprietary Trade-Names—*Continued.*

Neobovinine.—Combination of liver extract and hæmoglobin for use in the treatment of anæmias. (*Petrolagar, London.*)

Neocaine.—Brand of Procainæ Hydrochloridum. (*Corbière, Paris; Anglo-French Drug Co., London.*)

Neo-Cardyl.—Bismuth butylthiolaurate prepared in oily solution for intramuscular injection in doses of 1·5 millilitres in the treatment of syphilis. (*May and Baker, London.*)

Neo-Dmegon.—Anti-gonococcal vaccine prepared from a number of different strains of the gonococcus and synococcus. It is administered by intramuscular or subcutaneous injection in doses of 1 millilitre in the treatment of the complications of gonorrhœa. (*May and Baker, London.*)

Neo-Dmesta.—Anti-staphylococcal vaccine prepared from a number of different strains of staphylococci and *Micrococcus tetragenus*. It is administered by intramuscular or subcutaneous injection in doses of 1 millilitre in the treatment of staphylococcal infections. (*May and Baker, London.*)

Neo-Dmetys.—Vaccine prepared from the bacillus of Bordet and Gengou and administered by intramuscular or subcutaneous injection in the curative and prophylactic treatment of whooping cough. (*May and Baker, London.*)

Neodorm.—α-*iso*Propyl-α-bromobutyramide in tablet form. It is used as a sedative and hypnotic in doses of 5 to 15 grains. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Neo-Hexal.—Compound of hexamine, 1 molecule, and sulphosalicylic acid, 2 molecules, in tablet form. It is used for the same purposes as hexamine in doses of 0·5 to 1 gramme (8 to 15 grains). (*Reidel-de Haen, Berlin; Old Strand Chemical and Drug Co., London.*)

Neo-Hormonal.—Extract of spleen administered by intravenous or intramuscular injection in the treatment of chronic constipation and post-operative intestinal paralysis. (*Schering, London.*)

Neo-Hydriol.—Iodised ester of the fatty acids of poppy-seed oil containing 40 per cent. of iodine and having a low viscosity. It is used for the X-ray visualisation of the bronchi, spinal cord, kidneys and other organs. (*May and Baker, London.*)

Neohydropyrin.—Brand of Magnesii Acetylsalicylas. (*Richter, London.*)

Neokharsivan.—Brand of Neoarsphenamina. (*Burroughs Wellcome, London.*)

Neolyse.—Preparation of silica and magnesium compounds. It is supplied in cachets containing 0·5 gramme and in ampoules of solution for injection, and is used in the treatment of malignant growths. (*Fermé, Paris; Anglo-French Drug Co., London.*)

Neonal.—*n*-Butylethylbarbituric acid. It is administered in doses of from 0·05 to 0·1 gramme (¾ to 1½ grains) as a sedative and hypnotic. (*Abbott, Chicago; Pharmaceutical Products, London.*)

Neophenoquin.—Lithium compound of cinchophen in tablet form. (*Southall Bros. and Barclay, Birmingham.*)

Neo-Protosil (Neo-Silvol).—Preparation of colloidal silver iodide, 20 per cent., with a soluble protein base. It is used in aqueous solution in the treatment of inflammatory conditions of mucous membranes. (*Parke Davis, London.*)

Neo-Reargon.—Compound of silver and anthraquinone glycosides containing 14 per cent. of silver. It is used in the treatment of gonorrhœa. (*Norgue, Prague; Napp, London.*)

Neo-Salvarsan.—Brand of Neoarsphenamina. (*Bayer Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Neo-Silver Salvarsan.—Combined silverarsphenamine and neoarsphenamine. 0·3 gramme corresponds in therapeutic value to approximately 0·4 gramme of Neoarsphenamina. (*Bayer Products, London.*)

Neostam.—Nitrogen-glycoside of sodium *p*-aminophenylstibinate. It is injected intravenously in the treatment of kala-azar. (*Burroughs Wellcome, London.*)

Neostibosan.—Diethylamine *p*-aminophenylstibinate. It is injected intravenously in the treatment of kala-azar. (*Bayer Products, London.*)

Neo-trepol.—Isotonic aqueous suspension of precipitated bismuth containing in 1 millilitre 0·1 gramme of bismuth. (*Chenal et Doulhet, Paris; Anglo-French Drug Co., London.*)

Neotropin.—2-Butyloxy-2′:6′-diamino-5:5′-azopyridine. It is administered orally as a urinary antiseptic in the treatment of genito-urinary infections. (*Schering, London.*)

Neptal.—*o*-Hydroxymercuripropanolamidocarboxyphenoxyacetic acid. It is used as a diuretic in the treatment of cardiac or renal œdema and is administered by injection in doses of 1 millilitre (15 minims) containing 0·035 gramme (½ grain) of mercury. (*May and Baker, London.*)

Nepenthe.—Alcoholic preparation of opium containing 0 84 per cent. w/v of anhydrous morphine. It is used for the same purposes as Tinctura Opii. (*Ferris, Bristol.*)

Neurinase.—Preparation of soluble barbitone and extract of valerian. It is administered as a hypnotic and sedative in the form of tablets, or in solution containing in each fluid drachm 3 grains of soluble barbitone and ¾ grain of extract of valerian. (*Genevrier, Neuilly; Wilcox Jozeau, London.*)

Neutralon.—Synthetic aluminium sodium silicate. It is administered in doses of 2 to 4 grammes (½ to 1 drachm) in the treatment of hyperacidity and gastric or duodenal ulceration. (*Schering, London.*)

Nevrosthenic (Ampoules and Drops).—Solutions containing sodium glycerophosphate, and strychnine cacodylate for use in the treatment of neurasthenia. (*Fraisse, Paris; Wilcox Jozeau, London.*)

Nipabenzyl.—Benzyl ester of *p*-hydroxybenzoic acid. It is used as a preservative of pharmaceutical preparations in a concentration of 0·01 to 0·06 per cent. It is very slightly soluble in water, but readily soluble in alcohol, glycerin and oils. The sodium derivative is readily soluble in water. (*Penner, Berlin; Samuelson, London.*)

Nipagin A.—Ethyl ester of *p*-hydroxybenzoic acid. It is used as a preservative of creams and lotions in a concentration of 0·05 to 0·15 per cent. (*Penner, Berlin; Samuelson, London.*)

Nipagin M.—Methyl ester of *p*-hydroxybenzoic acid. It is used as a preservative of pharmaceutical preparations in a concentration of 0·05 to 0·2 per cent. It is slightly soluble in water (1 in 400) and readily soluble in oils (1 in 40). (*Penner, Berlin; Samuelson, London.*)

Nipakombin.—Water-soluble ester of *p*-hydroxybenzoic acid. It is used as a preservative in a concentration of 0·04 to 2 per cent. (*Penner, Berlin; Samuelson, London.*)

Nipasol M.—Propyl ester of *p*-hydroxybenzoic acid. It is used as a preservative of pharmaceutical preparations. It is very slightly soluble in water, but readily soluble in oils and organic solvents. The sodium derivative is readily soluble in water. (*Penner, Berlin; Samuelson, London.*)

Nirvanol.—γγ′-phenylethylhydantoin. It is administered in the form of powder or tablets in doses of 0·15 to 0·45 gramme (2½ to 7 grains) as a sedative and in the treatment of chorea. (*Heyden, Dresden; Braun, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Nizin.—Brand of Zinci Sulphanilas. (*Burroughs Wellcome, London.*)

Noctal.—*iso*Propylbromopropanylbarbituric acid in tablet form. It is administered as a sedative and hypnotic in doses of 0·1 to 0·2 gramme (1½ to 3 grains). (*Reidel-de Haen, Berlin; Old Strand Chemical and Drug Co., London.*)

Norit.—Brand of Carbo Activatus. (*Norit, Amsterdam; C. Zimmermann, London.*)

Normacol.—Preparation of the desiccated mucilage of a species of *Astragalus* with an extract of a species of *Frangula.* It is administered in doses of one to two drachms in the treatment of constipation. (*Norgine, Prague; Napp, London.*)

Novalgin.—Sodium phenyldimethylpyrazolonmethylaminomethanesulphonate. It is administered orally in the form of tablets or powder in doses of 0·5 gramme (7½ grains) or by injection as a 50 per cent. solution in doses of 1 to 2 millilitres (15 to 30 minims), in the treatment of rheumatic diseases. (*Bayer Products, London.*)

Novarsan.—Brand of Neoarsphenamina. (*Allen and Hanburys, London.*)

Novarsenobillon.—Brand of Neoarsphenamina. (*May and Baker, London.*)

Novaspirin.—Brand of Acidum Citrosalicum. (*Winthrop, New York.*)

Novasurol (Merbaphen).—Double salt of sodium mercurichlorophenyloxyacetate and barbitone containing about 34 per cent. of mercury. It is administered as a diuretic in doses of 0·5 to 2 millilitres of a 10 per cent. solution. (*Winthrop Chemical Co., New York; Bayer Products, London.*)

Novatophan.—Methyl ester of 2-phenylquinoline-4-carboxylic acid. It is used for the same purposes as Neocinchophenum. (*Schering, London.*)

Novocain.—Brand of Procainæ Hydrochloridum. (*Bayer-Meister Lucius, Leverkusen; Saccharin Corporation, London.*)

Novocol.—Sodium guaiacolphosphate. It is administered in the form of tablets or syrup in the treatment of catarrh and pulmonary affections. (*Richter, London.*)

Novostab.—Brand of Neoarsphenamina. (*Boots, Nottingham.*)

Nov-Umbrose.—Prepared barium sulphate for use as a barium meal. (*Allen and Hanburys, London.*)

Nujol.—Brand of Paraffinum Liquidum. (*Anglo-American Oil Co., New Jersey; Stemco, London.*)

Nyctal.—Brand of Carbromalum. (*Sitsa, Paris; Roberts, London.*)

Oestroform.—Brand of ketohydroxyoestrin (see Oestrinum). It is supplied for oral administration in the form of tablets each containing 1000 units, or for administration by injection as a solution containing 1000 or 10,000 units per millilitre. (*British Drug Houses, London.*)

Okistyptin.—Brand of Cotarninæ Chloridum. (*Richter, London.*)

Omnadin.—Vaccine for use in the treatment of various diseases by non-specific protein therapy. (*Bayer Products, London.*)

Omnopon (Pantopon).—Brand of Papaveretum. (*Hoffman-La Roche, London.*)

Opacin.—Brand of Iodophthaleinum. (*May and Baker, London.*)

Opacol.—Preparation of iodophthalein for oral administration as a single dose. (*May and Baker, London.*)

Opoidine.—Brand of Papaveretum. (*Macfarlan, London.*)

Optalidon.—Combination of 0·05 gramme of Sandoptal, 0·125 gramme of amidopyrine and 0·025 gramme of caffeine in tablet form. It is administered as a sedative and hypnotic in doses of 1 to 3 tablets. (*Sandoz, London; Brooks and Warburton, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Optarson.—Solution of ammonium heptinchlorarsonate and strychnine nitrate. It is administered by subcutaneous injection as a tonic in doses of 1 millilitre, containing 0·004 gramme of As_2O_3 in organic combination and 0·001 gramme of strychnine nitrate. (*Bayer Products, London.*)

Optinoktin.—Combination of phenobarbitone, 0·1 gramme (1½ grains), bromisovalerylurea, 0·2 gramme (3 grains), and amidopyrine, 0·2 gramme (3 grains), in tablet form. (*Richter, London.*)

Optochin.—Brand of Æthylhydrocupreina. (*Howards, Ilford.*)

Orargol.—Colloidal solution of gold and silver for oral, intramuscular, or intravenous administration, or for local application as an anti-infective agent. (*Anglo-French Drug Co., London.*)

Orarsan.—Brand of Acetarsol. (*Boots, Nottingham.*)

Orisol.—Berberine acid sulphate in 2 per cent. solution for infiltration injection in the treatment of antimony-resistant oriental sore. (*May and Baker, London.*)

Orthoform (New Orthoform).—Brand of Orthocaina. (*Bayer Products, London.*)

Ortizon.—Solid compound of hydrogen peroxide containing about 35 per cent. of H_2O_2. A 10 per cent. solution is approximately equivalent to solution of hydrogen peroxide. (*Bayer Products, London.*)

Ostelin.—Concentrate of vitamin D, miscible with water. It contains 5000 international units of vitamin D per millilitre, and is also available in the form of tablets, each containing 500 units of the vitamin, or emulsion, containing 2800 units per fluid ounce. (*Glaxo Laboratories, London.*)

Otosclerol.—Combination of cimicifugin, 6·66 per cent., bromine, 36·3 per cent., and phosphates, in tablet form. It is administered in the treatment of deafness. (*Muchener Pharmazeutische Fabrik, Munich; Coates and Cooper, London.*)

Otalgan.—5 per cent. solution of phenyldimethylpyrazolone in anhydrous glycerin. It is instilled into the ear in the treatment of middle-ear diseases. (*Sachs Serumwerk, Dresden; Napp, London.*)

Ovarnon.—Desiccated ovarian substance in tablet form, each tablet containing 0·15 gramme with 10 units of Menformon. (*Organon Laboratories, London.*)

Overaden.—Ovarian extract in tablet form, each tablet containing the equivalent of about 0·5 gramme of fresh gland. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Pacyl.—Preparation containing 0·005 gramme (1/12 grain) of a choline derivative in tablet form. It is administered by the mouth as a vasodilator in the treatment of arterial hypertension and its sequelæ. (*Wiernik, Berlin; Coates and Cooper, London.*)

Padutin.—Preparation of a vasomotor hormone obtained from the pancreas. It is used in the treatment of angiospasm, Raynaud's disease and other affections. (*Bayer Products, London.*)

Pancrobilin.—Preparation of pancreatic enzymes with bile salts. It is administered in the form of pills or liquid in the treatment of constipation. (*Reed and Carnrick, Jersey City; Coates and Cooper, London.*)

Pandigal.—Preparation of the glycoside, lanadigin, obtained from *Digitalis lanata*. It is supplied in the form of tablets, solution, ampoules, or suppositories for oral, intravenous, or rectal administration in doses of 0·0002 to 0·0004 gramme. (*Beiersdorf, Welwyn Garden City.*)

Panflavin.—Euflavine in tablet form, to be dissolved slowly in the mouth in the treatment of suppurating conditions of the mouth and throat. (*Bayer Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Panteric (Tablets).—Enteric-coated tablets containing 5 grains of triple-strength pancreatin. (*Parke Davis, London.*)

Panthesine.—N-diethyl-leucinol ester of *p*-aminobenzoic acid for use as a local anæsthetic in various strengths from 0·2 to 10 per cent. (*Sandoz, London; Brooks and Warburton, London.*)

Pantocain (Spinocain).—*p*-Butylaminobenzoyldimethylaminoethanol hydrochloride. It is used as an anæsthetic, particularly for the production of spinal, lumbar and surface anæsthesia. A viscous solution is supplied as "Pantocain L." (*Bayer Products, London.*)

Paracalcin.—Combination of $\frac{1}{10}$ grain of biologically standardised parathyroid and 3 grains of calcium lactate in tablet form. (*Endocrines, Watford.*)

Paranephrin.—Brand of Liquor Adrenalinæ Hydrochloridi. (*Merck, Darmstadt; Napp, London.*)

Paraphakin (Euphakin).—Combination of hormones in tablet form for oral administration in the treatment of senile cataract. (*Wiernik, Berlin; Coates and Cooper, London.*)

Para-thor-mone.—Brand of Extractum Parathyroidei. (*Eli Lilly, London.*)

Parenex.—Concentrated extract of liver administered by injection. It is supplied in 2 millilitre ampoules containing the equivalent of 9000 grains of fresh liver. (*Paines and Byrne, London.*)

Paroidin.—A biologically standardised parathyroid extract prepared for subcutaneous or intramuscular injection. (*Parke Davis, London.*)

Paroleine.—Brand of Paraffinum Liquidum or of Paraffinum Liquidum Leve. (*Burroughs Wellcome, London.*)

Parosan.—8-Acetylamino-3-hydroxy-1 : 4-benzisoxazine-6-arsonic acid, administered in the form of tablets containing 0·25 gramme (4 grains) in the treatment of disseminated sclerosis. (*May and Baker, London.*)

Pavon.—Preparation of total alkaloids of opium, containing 25 per cent. of morphine. It is supplied in various forms for oral or subcutaneous administration for the same purposes as Papaveretum. (*Ciba, London.*)

Pavopin.—Brand of Papaveretum. (*T. and H. Smith, London.*)

Pellidol.—Diacetylaminoazotoluol, a dark red powder, easily soluble in oils, fats and organic solvents, insoluble in water. It is used as a non-staining alternative to Rubrum Scarlatinum. (*Bayer Products, London.*)

Pentnucleotide (Nucleotide K.96).—A mixture of the sodium salts of pentose nucleotides. It is administered by intramuscular injection in the treatment of agranulocytic angina and similar conditions. (*Smith, Kline and French, Philadelphia; Menley and James, London.*)

Peptalmine.—Preparation of meat and fish peptones with extracts of eggs, milk, and wheat flour. It is administered orally in the treatment of anaphylactic disorders. (*Scientia, Paris; Wilcox Jozeau, London.*)

Per-Abrodil.—3 : 5-Diiodo-4-pyridon-N-acetate of diethanolamine, containing 51·8 per cent. of iodine. It is supplied as a 35 per cent. aqueous solution for use in intravenous pyelography. (*Bayer Products, London.*)

Percainal.—Ointment containing 1 per cent. of Percaine with solution of hamamelis and aluminium formate. It is used as an antipruritic and analgesic application in the treatment of certain skin affections. (*Ciba, London.*)

Percaine (Nupercaine).—Hydrochloride of α-butyloxycinchoninic acid diethylethylenediamide, occurring as an odourless, tasteless, crystalline compound softening at 90° and melting at 97°. It is readily soluble in water forming a neutral solution, and is used in various strengths as a local anæsthetic, and for infiltration and spinal anæsthesia. (*Ciba, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Perhepar.—Concentrated extract of liver supplied in the form of powder, of which 1 gramme is equivalent to 100 grammes of fresh liver, or as a solution, of which 10 millilitres is equivalent to 100 grammes of fresh liver. (*Richter, London.*)

Perhydrit.—Solid compound of urea and hydrogen peroxide containing 35 per cent. of H_2O_2. A 10 per cent. solution is approximately equivalent to solution of hydrogen peroxide. (*Merck, Darmstadt; Napp, London.*)

Perhydrol.—30 per cent. solution of hydrogen peroxide (100 volumes). (*Merck, Darmstadt; Napp, London.*)

Perichthol.—Brand of Ichthammol. (*British Drug Houses, London.*)

Peristaltin.—Active glycoside of cascara sagrada. It is administered orally in the form of tablets, or by hypodermic injection, in the treatment of constipation. (*Ciba, London.*)

Pernæmon.—Protein-free fraction of mammalian liver, containing the anti-anæmic principle, prepared for intramuscular injection. 1 millilitre, representing 5 grammes of fresh liver, when administered by injection is equivalent to 500 grammes of fresh liver. It is also prepared for oral administration. (*Organon Laboratories, London.*)

Pernæmon Forte.—Five times concentrated form of Pernæmon for treatment at long intervals. (*Organon Laboratories, London.*)

Pernocton.—Sodium salt of secondary butyl-β-bromallylbarbituric acid. It is supplied in 10 per cent. aqueous solution for use as a sedative and hypnotic and is administered by slow intravenous injection in doses varying, according to the patient, from 1 millilitre per 12·5 kilograms to 1 millilitre per 15 kilograms body weight. (*Riedel-de Haen, Berlin; Old Strand Chemical and Drug Co., London.*)

Peronin.—Brand of Benzylmorphinæ Hydrochloridum. (*Merck, Darmstadt; Napp, London.*)

Phanodorm.—Cyclohexenylethylbarbituric acid (cyclobarbital). It is administered as a mild hypnotic in doses of 0·1 gramme (1½ grains). (*Bayer Products, London.*)

Phenalgin.—Preparation containing acetanilide as the active constituent. It is administered in doses of 0·3 to 1 gramme (5 to 15 grains). (*Etna Chemical Co., London; Pearson, Mitcham.*)

Phenoquin.—Brand of Cinchophenum. (*Southall Bros. and Barclay, Birmingham.*)

Phenyl-Aspriodine.—Acetyliodosalol. It is administered in doses of 0·3 gramme (5 grains) in the treatment of rheumatic conditions and as an intestinal antiseptic. (*Martindale, London.*)

Phenyl-Sedasprin.—Acetylbromosalol. It is administered in doses of 0·3 gramme (5 grains) in the treatment of rheumatic conditions and as a bactericide in urinary affections. (*Martindale, London.*)

Phytin.—Calcium and magnesium salt of inositol hexaphosphoric acid. It is administered in the form of tablets, granules, or powder in the treatment of neurasthenia and debility. (*Ciba, London.*)

Pinol.—Brand of Oleum Pini Pumilionis. (*Burroughs Wellcome, London.*)

Pitalin.—Pituitary (posterior lobe) extract containing 5 units in 1 millilitre, with 0·0005 gramme of adrenaline. (*Paines and Byrne, London.*)

Pitibulin.—Brand of Extractum Pituitarii Liquidum. (*Allen and Hanburys, London.*)

Pitocin.—Preparation containing the oxytocic principle of Extractum Pituitarii Liquidum. (*Parke Davis, London.*)

Piton.—Brand of Extractum Pituitarii Liquidum. It is also supplied as a powder containing 1 unit per 0·001 gramme. (*Organon Laboratories, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Pitoxylin.—Brand of Extractum Pituitarii Liquidum. (*Oxo, London.*)

Pitressin.—Preparation containing the pressor principle of Extractum Pituitarii Liquidum. (*Parke Davis, London.*)

Pituchinol.—Preparation containing in 1 millilitre 3 units of pituitary (posterior lobe) extract and 1 gramme of quinine. (*Homburg, Frankfurt; Spicer, London.*)

Pituitrin.—Brand of Extractum Pituitarii Liquidum. (*Parke Davis, London.*)

Planadalin.—Brand of Carbromalum. (*May and Baker, London.*)

Planocaine.—Brand of Procainæ Hydrochloridum. (*May and Baker, London.*)

Planochrome.—Brand of Mercurochromum. (*May and Baker, London.*)

Plasmoquine.—N-diethylamino*iso*pentyl-8-amino-6-methoxyquinoline. It is administered in tablet form in the treatment of malaria. (*Bayer Products, London.*)

Plasmoquine Compound.—Combination of 0·01 gramme of Plasmoquine and 0·125 gramme of quinine sulphate in tablet form. (*Bayer Products, London.*)

Plastic X.—Brand of Tricresylis Phosphas. (*Boake Roberts, Stratford.*)

Pollaccine.—Vaccine prepared from *Phleum pratense* for the prophylaxis and treatment of hay fever. (*Parke Davis, London.*)

Pollantin.—Serum obtained from animals which have been treated with a preparation of the pollen-grains of various species of *Gramineæ*. It is prepared in various forms for use in the treatment of hay fever. (*Schimmel, Leipzig; Willows, Francis, Butler and Thompson, London.*)

Polyglandin.—Polyglandular extract administered orally or by injection in the treatment of neurasthenia and other diseases. (*Allen and Hanburys, London.*)

Pragmoline.—Acetylcholine bromide, supplied as a stable solution in two strengths containing respectively 6 per cent. and 12·5 per cent. (*May and Baker, London.*)

Pregnyl.—Anterior pituitary-like hormone extracted from the urine of pregnant women. It is supplied for oral administration in the form of tablets each containing 90 rat units, or, for administration by injection, in ampoules containing 30 or 100 rat units. (*Organon Laboratories, London.*)

Progynon.—Biologically standardised preparation containing ketohydroxyoestrin (see Oestrinum). (*Schering, London.*)

Prokliman.—Ovarian hormone compound containing also Peristaltin, nitroglycerin, amidopyrine and caffeine sodium salicylate, in tablet form. It is administered in the treatment of menopausal disturbances. (*Ciba, London.*)

Prolan.—Standardised preparation containing the anterior pituitary hormone. It is administered orally in the form of pellets, each containing the equivalent of 150 rat units, or by intramuscular injection of a solution of the powder, which is supplied in dry ampoules containing the equivalent of 100 rat units. (*Bayer Products, London.*)

Proliferase.—Preparation of yeast supplied in 2·5 millilitre ampoules containing 130 to 140 million cells. It is administered orally for the same purposes as Cerevisiæ Fermentum. (*Anglo-French Drug Co., London.*)

Prominal.—N-methylethylphenylmalonylurea. It is administered in the treatment of epilepsy in doses of 0·2 to 0·4 gramme daily. (*Bayer Products, London.*)

Propidex.—Ointment containing a mixed vaccine of streptococci, staphylococci and *B. pyocyaneus*. It is applied locally in the treatment of pyogenic surface lesions. (*May and Baker, London.*)

Protargol.—Brand of Argenti Proteinas. (*Bayer Products, London.*)

Protegin.—Yellowish, soft, organic substance melting at about 40°. It is used as an emulsifying agent, giving water-in-oil emulsions, in the preparation of cosmetic creams. (*Goldschmidt, Essen; M. R. Chemical Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Protosil (Silvol).—Brand of Argenti Proteinas Mite. (*Parke Davis, London.*)

Psicaine.—Acid tartrate of *d*-γ-cocaine used as a local anæsthetic. (*Merck, Darmstadt; Napp, London.*)

Psylla.—Brand of Psyllium. (*Battle Creek Food Co., Battle Creek; Coates and Cooper, London.*)

Purgen.—Tablets containing phenolphthalein. They are supplied in three strengths containing in each tablet respectively 0·05, 0·1 and 0·5 gramme of phenolphthalein. (*Kirby, London.*)

Pyramidon.—Brand of Amidopyrina. (*Bayer Products, London.*)

Pyridium.—Hydrochloride of phenylazo-αα-diaminopyridine, an antiseptic used in the treatment of infections of the urinary tract. It is administered orally in doses of 0·2 gramme (3 grains) three times daily in the form of 0·1 gramme tablets. For local application to infected surfaces, it may be applied in aqueous solution (1 per cent.), or as an ointment (10 per cent.) or powder. (*Pyridium Corporation, New York; Menley and James, London.*)

Pyrolactin.—Sterile fat-free milk, either plain or prepared with various additions, for injection in treatment by non-specific protein therapy. (*Research Products, London.*)

Quadronal.—Combination of phenazone, phenacetin, caffeine and lactyl-*p*-phenetidin in tablet form for administration as an analgesic. (*Asta, Brackwede; Pharmaceutical Products, London.*)

Quadro-Nox.—Combination of barbitone, 80 per cent., and Quadronal, 20 per cent., in the form of tablets weighing 0·6 gramme. It is used as a soporific. (*Asta, Brackwede; Pharmaceutical Products, London.*)

Quinine-Phytin.—Combination of Phytin and quinine in tablet form. (*Ciba, London.*)

Quinisal.—Brand of Quininæ Disalicylosalicylas. (*Boehringer, Mannheim.*)

Quinisan.—Brand of Quininæ Disalicylosalicylas. (*Howards, Ilford.*)

Quinoplasmoquine.—Combination of 0·01 gramme of Plasmoquine and 0·3 gramme of quinine sulphate in tablet form. (*Bayer Products, London.*)

Quinostab.—A 10 per cent. suspension of quinine iodobismuthate in olive oil, for the treatment of syphilis. (*Boots, Nottingham.*)

Quinoxyl.—Iodohydroxyquinolinesulphonic acid, 80 per cent., with sodium bicarbonate, 20 per cent. It occurs as a yellow powder soluble in water, and is administered as an antiseptic, particularly in the treatment of amœbic dysentery, in doses of 0·25 to 1 gramme (4 to 15 grains) three times a day. It may also be administered by rectal injection of 200 millilitres of a 2·5 per cent. solution. (*Burroughs Wellcome, London.*)

Radiostol.—Brand of Liquor Ergosterolis Irradiati. It is also available in the form of pellets each equivalent to 1 millilitre (15 minims) of the solution. (*British Drug Houses, London.*)

Radiostoleum.—Mixture of Radiostol solution with a concentrate of vitamin A. It is supplied as an oily solution containing 3000 units of vitamin D per gramme and having a vitamin A activity of 500 blue units, or in capsules. (*British Drug Houses, London.*)

Renaglandin.—Brand of Liquor Adrenalinæ Hydrochloridi. (*Oppenheimer, London.*)

Resyl.—Preparation containing glyceroguaiacolether administered orally or by intramuscular injection, as a substitute for guaiacol. (*Ciba, London.*)

Rhodan-Calcium Diuretin.—Combination of 7½ grains of Calcium-Diuretin and 1½ grains of potassium thiocyanate in tablet form. It is administered in the treatment of hypertonia and arteriosclerosis. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Rhodapurin.—Trimethylxanthinethiocyanammonia in tablet form. It is administered in the treatment of arterial hypertension. (*Homburg, Frankfurt; Spicer, London.*)

Riodine.—Iodoglyceric ester of ricinoleic acid. It is administered in the form of capsules containing the equivalent of 0·2 gramme of iodine as a substitute for inorganic iodides. (*Astier, Paris; Wilcox Jozeau, London.*)

Rivanol.—2-Ethoxy-6 : 9-diaminoacridine lactate, a yellow, water-soluble dye. It is used as a general antiseptic in dilutions of 1 in 2000 to 1 in 500. Solutions of 1 in 5000 are employed as enemata in the treatment of amœbic dysentery. (*Bayer Products, London.*)

Rubyl.—Suspension of quinine bismuth iodide in oil, supplied in ampoules containing 0·3 gramme in 3 millilitres for intramuscular injection in the treatment of syphilis. (*May and Baker, London.*)

Rutonal.—Methylphenobarbitone. It is supplied in the form of 3 grain tablets for administration as a sedative and hypnotic, particularly in the treatment of epilepsy. (*May and Baker, London.*)

Salen.—Liquid mixture of the methyl- and ethyl-glycollic acid esters of salicylic acid. It is applied locally, diluted if necessary with a mixture of chloroform and olive oil, in the treatment of rheumatic affections and neuralgia. It is also supplied as an ointment (Salenal) containing 33 per cent. (*Ciba, London.*)

Sal-Ethyl.—Brand of Æthylis Salicylas. (*Parke Davis, London.*)

Sal Ethyl Carbonate.—Carbonic acid ester of ethyl salicylate administered in the form of 5 grain tablets as an analgesic and antipyretic. (*Parke Davis, London.*)

Salipyrin.—Brand of Phenazoni Salicylas. (*Riedel-de Haen, Berlin; Old Strand Chemical and Drug Co., London.*)

Salit.—Bornyl salicylate, an oily liquid insoluble in water, miscible with alcohol, ether, chloroform and fixed oils. It is applied externally, either diluted with oil or as an ointment, in the treatment of neuralgia and rheumatism. (*Heyden, Dresden; Braun, London.*)

Salophen.—Acetyl-*p*-amidosalol, white crystals, insoluble in water. It is administered in doses of 0·3 to 1 gramme (5 to 15 grains) in the treatment of neuralgia and rheumatic conditions. (*Bayer Products, London.*)

Salvarsan.—Brand of Arsphenamina. (*Bayer Products, London.*)

Salyrgan.—Complex compound of mercury and sodium salicylallylamino-*o*-acetate, containing about 40 per cent. of mercury. It is used as a diuretic in cardiac or renal œdema, being administered intramuscularly or intravenously as a 10 per cent. solution in doses of 0·5 to 2 millilitres (8 to 30 minims). (*Bayer Products, London.*)

Sandoptal.—*iso*Butylallylbarbituric acid in tablet form. It is administered as a sedative and hypnotic in doses of 3 to 9 grains. (*Sandoz, London; Brooks and Warburton, London.*)

Sanocrysin.—Brand of Auri et Sodii Thiosulphas. (*Dansk Chemo-Therapeutisk Selskab, Copenhagen; Napp, London.*)

Santyl.—Salicylic ester of santalol. It is administered in capsules in place of oil of sandal wood. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Saridone.—Combination of phenyldimethyl*iso*propylpyrazolone, 1¼ grains, phenacetin, 2½ grains, and caffeine, ⅜ grain, in tablet form. It is administered as an analgesic in doses of 1 to 3 tablets. (*Hoffman-La Roche, London.*)

Sauerin.—Culture of *Bacillus Bulgaricus* supplied in liquid form for the preparation of curdled milk, or in capsules for internal administration. (*Allen and Hanburys, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Saxin.—Brand of Saccharinum in tablet form. (*Burroughs Wellcome, London.*)

Scillaren.—Mixture of the glycosides of squill having an action on the heart similar to that of digitalis. It is administered orally in the form of tablets or solution, in doses of 0·0008 to 0·0016 gramme ($\frac{1}{80}$ to $\frac{1}{40}$ grain), and is also prepared for intravenous administration when immediate effects are required. (*Sandoz, London; Brooks and Warburton, London.*)

Scleroveine.—Sterile solution of sodium salicylate supplied in ampoules for the injection treatment of varicose veins. (*Bengué, London.*)

Scuroforme.—*n*-Butyl *p*-aminobenzoate, a white, crystalline powder, very slightly soluble in water. It is used in oily or glycerin-alcohol solution as a local anæsthetic. (*May and Baker, London.*)

Sedasprin.—Acetylbromosalicylic acid. It is administered in the form of tablets or cachets in doses of 0·3 to 0·6 gramme (5 to 10 grains) as a sedative. (*Martindale, London.*)

Sedin.—Combination of potassium bromide, 0·4 gramme (6½ grains), sodium bromide, 0·4 gramme (6½ grains), and ammonium bromide, 0·2 gramme (3 grains) with vegetable extractive, in tablet form. It is administered dissolved in hot water as a sedative bouillon. (*Hommel's Hæmatogen Co., London.*)

Sedobrol.—Tablets containing in each about 1·1 grammes (17 grains) of sodium bromide with vegetable extractives. It is administered dissolved in hot water as a sedative bouillon. (*Hoffman-La Roche, London.*)

Sedormid.—Allyl*iso*propylacetylurea. It is administered in doses of 0·25 gramme (4 grains) or more as a sedative and hypnotic. (*Hoffman-La Roche, London.*)

Selarom.—Mixture of the calcium, magnesium and sodium salts of aliphatic acids used as a substitute for sodium chloride in salt-free dietary. (*Bayer Products, London.*)

Seroden.—Combination of iodine with serum proteins. It is administered in the form of capsules containing 1 grain of organically combined iodine as a substitute for inorganic iodides. (*Allen and Hanburys, London.*)

Sextate.—Brand of Methylcyclohexanylis Acetas. (*Howards, Ilford.*)

Sextol.—Brand of Methylcyclohexanolum. (*Howards, Ilford.*)

Sextone.—Brand of Cyclohexanonum. (*Howards, Ilford.*)

Sextone B.—Brand of Methylcyclohexanonum. (*Howards, Ilford.*)

Shadoform.—Prepared barium sulphate for the preparation of a barium meal. Shado-Cream is a prepared barium meal. (*British Drug Houses, London.*)

Silantox.—Colloidal silica. It is used as an intestinal absorbent and is also used externally as a compound dusting powder. (*Silica Gel, London; Savory and Moore, London.*)

Silver Salvarsan.—Brand of Arsphenamina Argentica. (*Bayer Products, London.*)

Sionin.—*d*-Sorbitol, used as a substitute for sugar for use by diabetics. (*Bayer Products, London.*)

Sistomensin.—Lipo-soluble ovarian hormone. It is administered in the treatment of menorrhagia and in affections of the menopause. (*Ciba, London.*)

Soamin.—Brand of Sodii Aminarsonas. (*Burroughs Wellcome, London.*)

Soderseine.—Colloidal suspension of bismuth sesquioxide. It is administered in doses of ½ to 2 fluid ounces in the treatment of pertussis. (*Pecoul, Paris; Wilcox Jozeau, London.*)

Sodium Amytal.—Sodium derivative of Amytal. It may be administered by intravenous injection as a 10 per cent. solution in doses of 0·25 to 1 gramme (4 to 15 grains). (*Eli Lilly, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Sodium Diarsenol.—Sodium derivative of Diarsenol. (*Diarsenol Co., Buffalo.*)

Sodium Salvarsan.—Sodium derivative of Salvarsan. (*Bayer Products, London.*)

Solactol.—Brand of Æthylis Lactas. (*Byk-Guldenwerke, Berlin.*)

Solargentum.—Brand of Argenti Proteinas Mite. (*Squibb, New York.*)

Solganal.—Di-sodium salt of 4-sulphomethylamino-2-auromercaptobenzol-1-sulphonic acid. It is administered intravenously in the treatment of tuberculosis and leprosy, in doses of from 0·01 to 0·5 gramme ($\frac{1}{6}$ to $7\frac{1}{2}$ grains). It is also prepared for oral administration in infective arthritis. (*Schering, London.*)

Solganal B.—Aurothioglucose. It is administered intramuscularly in solution or in suspension in oil in doses of 0·01 to 0·5 gramme ($\frac{1}{6}$ to $7\frac{1}{2}$ grains). (*Schering, London.*)

Solurol.—Brand of Acidum Thyminicum. (*Allen and Hanburys, London.*)

Solution S.T.37.—Solution of hexyl-resorcinol for topical application as an antiseptic. (*Sharp and Dohme, London.*)

Somnifaine.—Solution of the diethylamine salts of diethyl- and allyl*iso*propyl-barbituric acids. It is administered in drops or by intramuscular injection as a sedative and hypnotic. (*Hoffman-La Roche, London.*)

Somnigen.—Dialysed solution in sherry of the hydrobromides of the total alkaloids of opium, containing 0·75 per cent. w/v of morphine. It is administered in doses of 5 to 40 minims. (*Hewlett, London.*)

Somnoform.—Anæsthetic for use by inhalation in dentistry, containing ethyl chloride, methyl chloride and ethyl bromide. (*de Trey, Berlin.; Amalgamated Dental Co., London.*)

Somnos.—Elixir containing 5·5 per cent. of chloral glycerolate. It is administered in doses of 4 to 8 millilitres (1 to 2 fluid drachms) as a sedative and 15 to 30 millilitres ($\frac{1}{2}$ to 1 fluid ounce) as a hypnotic. (*Sharp and Dohme, London.*)

Somnosal.—Combination of *a*-brom*iso*valerianylurea (2 parts) and amidopyrine (1 part). It is administered in doses of $7\frac{1}{2}$ to 15 grains as a sedative and soporific. (*Napp, London.*)

Soneryl.—Butylethylbarbituric acid. It is supplied in tablet form or in solution in ampoules for administration as a sedative and hypnotic in doses of from 0·1 to 0·3 gramme ($1\frac{1}{2}$ to $4\frac{1}{2}$ grains). (*May and Baker, London.*)

Soneryl-Sodium.—Sodium derivative of Soneryl. It is supplied in the form of capsules containing 0·15 gramme ($2\frac{1}{4}$ grains) and is administered as a pre-operative basal anæsthetic in doses of approximately one capsule per 36 pounds body weight. (*May and Baker, London.*)

Soricin.—Brand of Sodii Ricinoleas. (*Merrell, Cincinnati; Squire, London.*)

Spasmalgin.—Mixture of papaverine, a sulphonated derivative of atropine and a preparation of the total alkaloids of opium. It is administered orally in tablets or by subcutaneous or intramuscular injection of a solution for the relief of spasmodic and other pains. (*Hoffman-La Roche, London.*)

Spasmine.—Brand of Benzylis Succinas. (*Bush, London.*)

Spasmodin.—Brand of Benzylis Benzoas. (*Bush, London.*)

Spasticine.—Combination of benzyl succinate, papaverine hydrochloride and atropine methylbromide in tablet form. It is administered as a sedative for plain muscle organs. (*Napp, London.*)

Sphagnol.—A tar product prepared from peat and used in the form of ointment and soap in the treatment of various skin affections. (*Peat Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Spirobismol.—Oily solution of a preparation of lecithin and quinine iodobismuthate. It is administered by intramuscular injection in the treatment of syphilis. (*Homburg, Frankfurt; Spicer, London.*)

Spirocid.—Brand of Acetarsol. (*Bayer Products, London.*)

Spironine.—Preparation containing in each fluid drachm 3 grains of diiodocaffeine hydriodide and the soluble constituents of 7½ grains of coffee. It is administered in doses of 1 fluid drachm in the treatment of asthma. (*British Drug Houses, London.*)

Spirosal.—Monoglycol salicylate, $C_6H_4(OH)\cdot COO\cdot CH_2CH_2OH$. It is applied externally, diluted with alcohol or olive oil, or in an ointment, as an anti-rheumatic. (*Bayer Product, London.*)

Splenoxoid.—Flavoured liquid extract of spleen. It is administered in the treatment of tuberculous lungs, bones and joints, and of polycythæmia. (*Oxo, London.*)

Stabilarsan.—Arsphenamine diglucoside in dextrose solution, supplied in ampoules for use in the treatment of syphilis. (*Boots, Nottingham.*)

Stabismol.—Solution of an oil-soluble bismuth compound in olive oil, each millilitre containing the equivalent of 0·08 gramme of metallic bismuth. It is supplied in 2·5 millilitre and 1·2 millilitre ampoules and 1 fluid ounce bottles, for intramuscular injection in the treatment of syphilis. (*Boots, Nottingham.*)

Stannoxyl.—Preparations containing tin in various forms for use in the treatment of furunculosis and other staphylococcal infections. Tablets for oral administration contain 42·5 per cent. of metallic tin and 7·5 per cent. of tin oxide. The liquid and ointment contain stannous chloride. It is also supplied in 2 millilitre ampoules, containing the equivalent of 0·004 gramme of tin, for intramuscular injection. (*Robert et Carrière, Paris; Anglo-French Drug Co., London.*)

Staphar.—Mixed staphylococcus vaccine. (*Bayer Products, London.*)

Stipolac.—Brand of Iodophthaleinum. (*Burroughs Wellcome, London.*)

Stovaine.—Brand of Amylocainæ Hydrochloridum. (*May and Baker, London.*)

Stovarsol.—Brand of Acetarsol. (*May and Baker, London.*)

Stovarsol-Sodium.—Sodium salt of Stovarsol. It is supplied in ampoules containing 0·5 to 1·5 gramme for intramuscular or subcutaneous injection in the treatment of yaws and malaria. (*May and Baker, London.*)

Strophanthone.—Physiologically standardised, non-alcoholic preparation of the active principles of strophanthus. It is administered orally in doses of 0·12 to 0·6 millilitre (2 to 10 minims) and is also prepared for hypodermic or intravenous administration. (*Parke Davis, London.*)

Styptarnin.—Brand of Cotarninæ Chloridum. (*Allen and Hanburys, London.*)

Stypticin.—Brand of Cotarninæ Chloridum. (*Merck, Darmstadt; Napp, London.*)

Styptol.—Brand of Cotarninæ Phthalas in tablet form. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Styracol.—Brand of Guaiacolis Cinnamas. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Sulfarsenol.—Brand of Sulpharsphenamina. (*Laboratoire Biochemie Médicale, Paris; Modern Pharmacals, London.*)

Sulfosin.—Sterile 1 per cent. solution of sulphur in olive oil, supplied in ampoules containing 2, 5 or 10 millilitres for use in the treatment of syphilis, particularly neurosyphilis. It is administered in doses of 1 millilitre gradually increased to 10 millilitres until the temperature rises to 104°F. (*Leo, Copenhagen; Bencard, London.*)

Sulphostab.—Brand of Sulpharsphenamina. (*Boots, Nottingham.*)

Substances with Proprietary Trade-Names—*Continued.*

S.U.M.36.—Complex organic symmetrical urea administered by intramuscular injection in the treatment of gonococcal infections. (*British Drug Houses, London.*)

S.U.P.36.—Complex organic symmetrical urea administered by intramuscular injection in the early stages of influenza and other acute inflammatory conditions, in doses of 0·5 to 1 millilitre of a 1 per cent. solution. (*British Drug Houses, London.*)

S.U.P.468.—Complex organic symmetrical urea administered by intramuscular injection in the treatment of acute streptococcal infections and in erysipelas. (*British Drug Houses, London.*)

Superol.—Brand of Potassii Hydroxyquinolini Sulphas. (*Superol, Beverwijk.*)

Suprachol.—Sodium dehydrocholate supplied in solution for intravenous administration or in the form of tablets for oral administration in the treatment of hepatic disorders. (*Richter, London.*)

Suprarenalin.—Brand of Adrenalina. (*Armour, London.*)

Suprarenin.—Brand of Adrenalina. (*Bayer Products, London.*)

Synthalin.—Decamethylenediguanidine dihydrochloride. It is given by the mouth in doses of from 0·01 gramme ($\frac{1}{6}$ grain) as a substitute for insulin. (*Schering, London.*)

Synthalin B.—Dodecamethyldiguanidine hydrochloride. It is given by the mouth in doses of 0·005 gramme ($\frac{1}{12}$ grain) as a substitute for insulin. (*Schering, London.*)

Takadiastase.—Enzyme obtained from a species of *Eurotium oryzæ*, cultivated on wheat bran. It has marked amylolytic properties and is used in the treatment of amylaceous dyspepsia in doses of 0·06 to 0·3 gramme (1 to 5 grains). (*Parke Davis, London.*)

Tannalbin.—Albumin tannate. It is administered in doses of 0·5 to 1 gramme ($7\frac{1}{2}$ to 15 grains) as an intestinal antiseptic. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Tannigen.—Brand of Acetannin. (*Bayer Products, London.*)

Tannoform.—Brand of Methyleneditannin. (*Merck, Darmstadt; Napp, London.*)

Tegin.—Organic wax-like substance melting at 57°. It is used as an emulsifying agent, giving oil-in-water emulsions in the preparation of cosmetic creams. (*Goldschmidt, Essen; M. R. Chemical Products, London.*)

Tenebryl.—Sodium salt of diiodomethanesulphonic acid, containing 68 per cent. of iodine. It is used for intravenous pyelography and for various X-ray explorations and is administered in doses of 15 grammes dissolved in 75 millilitres of distilled water. (*Guerbet, St. Ouen; Bengué, London.*)

Terpichin.—Oily solution containing oil of turpentine and quinine. It is administered by injection in the treatment of various skin affections. (*Oestreicher, Berlin; C. Zimmermann, London.*)

Testamon.—Desiccated testicular substance in tablet form. (*Organon Laboratories, London.*)

Tetanol.—Calcium levulinate. It is administered in the treatment of calcium deficiency in doses of 5 to 20 millilitres of a 13 per cent. solution given intravenously, or 2 millilitres of a 25 per cent. solution given intramuscularly. (*British Colloids, London.*)

Tetraform.—Brand of Carbonei Tetrachloridum. (*British Drug Houses, London.*)

Tetrophan.—Dihydronaphthacridinemesocarboxylic acid, a synthetic derivative of quinolinecarboxylic acid, in tablet form. It is administered in doses of 0·1 gramme ($1\frac{1}{2}$ grains) in the treatment of disseminated sclerosis and other diseases of the central nervous system. (*Riedel-de Haen, Berlin; Old Strand Chemical and Drug Co., London.*)

Substances with Proprietary Trade-Names—*Continued.*

Thallium-Depilatorium.—Preparation of thallium administered internally for the production of epilation in the treatment of ringworm. (*Schering, London.*)

Theacylon.—Acetylsalicyloyltheobromine. It is administered as a diuretic in the treatment of œdema of cardiac origin. (*Merck, Darmstadt; Napp, London.*)

Theelin.—Brand of ketohydroxyoestrin (see Oestrinum). It is supplied for hypodermic administration as a solution in ampoules containing 50 Doisy rat units per millilitre, and is administered in doses of 1 to 2 millilitres. It is also supplied in the form of pessaries containing 50 rat units. (*Parke Davis, London.*)

Theelol.—Brand of trihydroxyoestrin (see Oestrinum). It is supplied in capsules each representing 50 Doisy rat units. (*Parke Davis, London.*)

Thelestrin.—Solution of ketohydroxyoestrin (see Oestrinum) for hypodermic injection, each millilitre containing 25 Doisy rat units. (*Carnrick, Newark, N.J.; Brooks and Warburton, London.*)

Theocin.—Brand of Theophyllina. (*Bayer Products, London.*)

Theogardenal.—Combination of theobromine, 5 grains, and Gardenal, ¼ grain, in tablet form. (*May and Baker, London.*)

Theominal.—Combination of 0·03 gramme (½ grain) of Luminal and 0·3 gramme (5 grains) of theobromine in tablet form. (*Bayer Products, London.*)

Thigenol.—Solution of sodium sulpholeate applied externally in the treatment of acne and herpes. (*Hoffmann-La Roche, London.*)

Thilocologne.—Brand of Æthylis Chloridum containing 0·5 per cent. of eau de Cologne. (*Thilo, Mainz; Coates and Cooper, London.*)

Thio-Bismol.—Sodium bismuth thioglycollate. It is administered in doses of 0·15 to 0·2 gramme by intramuscular injection of an aqueous solution in the treatment of syphilis. (*Parke Davis, London.*)

Thiocol.—Brand of Potassii Guaiacolsulphonas. (*Hoffman-La Roche, London.*)

Thiol.—Preparation used for the same purposes as Ichthammol. (*Riedel-de Haen, Berlin; Old Strand Chemical and Drug Co., London.*)

Thiostab.—Sterile 10 per cent. solution of sodium thiosulphate for injection in the treatment of intoxication arising from the administration of arsenic, bismuth, or mercury preparations. (*Boots, Nottingham.*)

Thorotrast.—Colloidal solution containing 25 per cent. of thorium dioxide stabilised by carbohydrates. It is used as a contrast medium for the X-ray diagnosis of sinuses, etc., for pyelography, cystography and similar purposes. (*Heyden, Dresden; Braun, London.*)

Thyracoids.—Biologically standardised iodothyroglobulin in tablet form. It is administered for the same purposes as Thyroideum. (*Reed and Carnrick, Jersey City; Coates and Cooper, London.*)

Thyraden.—Thyroid extract in tablet form, each tablet containing the equivalent of 0·3 gramme of fresh gland. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Thyranon.—Brand of Thyroideum, standardised biologically and also standardised chemically to contain 0·2 per cent. of organic iodine. (*Organon Laboratories, London.*)

Thyrocol.—Preparation used for the same purposes as Thyroideum. (*Oppenheimer, London.*)

Thyroidectin.—Powder prepared from the blood of thyroidectomised animals, administered in doses of 5 grains in the treatment of hyperthyroidism. (*Parke Davis, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Thyroprotein.—Prepared extract of thyroid standardised to contain 0·33 per cent. of organically combined iodine. It is administered in doses of $\frac{1}{60}$ to $\frac{1}{10}$ grain. (*Parke Davis, London.*)

Tin-Ox.—Combination of tin and tin oxide in tablet form, administered in the treatment of furunculosis and staphylococcal infections. (*John Bell, Hills, and Lucas, London.*)

Tiodine.—Brand of Thiosinaminæ Æthylis Iodidum. (*Gognet, Paris; Roberts, London.*)

Tolamine.—Brand of Chloramina. (*Burroughs Wellcome, London.*)

Tolysin.—Brand of Neocinchophenum. (*Calco, Bound Brook, N.J.; Martindale, London.*)

Tonocholin.—Acetylcholinæ Hydrochloridum in aqueous solution containing 0·05 gramme per millilitre. (*Richter, London.*)

Torost.—Combination of Ostelin with an extract of yeast containing the vitamin B complex in tablet form. Each tablet contains 500 units of vitamin D and the equivalent of 10 grains of fresh yeast. (*Glaxo Laboratories, London.*)

Transpulmin.—Oily solution of quinine and camphor administered by intramuscular injection in the treatment of affections of the lower air-passages. (*Homburg, Frankfurt; Spicer, London.*)

Tréparsol.—Formyl-*m*-amino-*p*-oxyphenylarsonic acid in tablet form. It is administered orally in the treatment of syphilis. (*Lecoq et Ferrand, Paris; Bengué, London.*)

Trépol.—Oily suspension of bismuth oxytartrate for administration by intramuscular injection in the treatment of syphilis and yaws. (*Chenal et Douilhet, Paris; Anglo-French Drug Co., London.*)

Tricalcine.—Mixture of tribasic phosphates, carbonates and other salts of calcium and magnesium. It is administered in the treatment of mineral deficiency. (*Scientia, Paris; Wilcox Jozeau, London.*)

Triferrin.—Organic preparation containing about 15 per cent. of iron and 2 to 2·5 per cent. of phosphorus in tablet form. (*Knoll, Ludwigshafen; Pharmaceutical Products, London.*)

Trigemin.—Combination of amidopyrine and butylchloral hydrate. It is supplied in various forms for administration in doses of 0·25 to 0·5 gramme ($3\frac{3}{4}$ to $7\frac{1}{2}$ grains) as an analgesic. (*Bayer Products, London.*)

Trikresol.—Mixture of *o*-, *m*- and *p*-cresol. (*Schering, London.*)

Trilactine.—Preparation containing lactic acid-forming bacilli. (*Martindale, London.*)

Trional.—Brand of Methysulphonal. (*Bayer Products, London.*)

Triphal.—Sodium salt of aurothiobenzimidazocarboxylic acid. It is given in doses of 0·025 to 0·2 gramme ($\frac{1}{2}$ to 3 grains) in the treatment of tuberculosis. (*Bayer Products, London.*)

Trivalin.—Solution containing in 1 millilitre 0·0037 gramme ($\frac{1}{17}$ grain) of caffeine valerianate, 0·0054 gramme ($\frac{1}{12}$ grain) of cocaine valerianate and 0·0019 gramme ($\frac{1}{30}$ grain) of morphine valerianate. It is administered either orally or by injection in doses of 0·5 to 1 millilitre (8 to 15 minims) for the relief of pain. It is also available in the form of capsules. (*Saccharin Corporation, London.*)

Tryparsamide.—Registered name for Tryparsonum. (*Rockefeller Foundation, New York.*)

Tutocaine.—Hydrochloride of *p*-aminobenzoyldimethylaminomethylbutanol. It is used in 0·2 to 2 per cent. aqueous solution as a local anæsthetic. (*Bayer Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Tylcalsin.—Brand of Calcii Acetylsalicylas. (*Martindale, London.*)

Tyllithin.—Brand of Lithii Acetylsalicylas. (*Martindale, London.*)

Umbrathor.—Unstabilised colloidal solution of thorium dioxide for the X-ray visualisation of mucous membrane. (*Heyden, Dresden; Braun, London.*)

Umbrenal.—25 per cent. solution of lithium iodide for use in pyelography. (*Schering, London.*)

Unden.—Biologically standardised preparation of ketohydroxyoestrin (see Oestrinum), administered orally or by intramuscular injection. (*Bayer Products, London.*)

Urea Stibamine.—Organic compound of antimony used in the treatment of kala-azar. (*Brahmachari Institute, Calcutta; Martindale, London.*)

Urodonal.—Granular effervescent preparation of hexamine, administered in the treatment of rheumatism. (*Chatelain, Paris; Spencer, London.*)

Uroselectan.—Sodium salt of 2-hydroxy-5-iodopyridine-N-acetic acid containing 47 per cent. of iodine. It is administered by intravenous injection of 100 millilitres of a 30 per cent. w/v solution in sterilised re-distilled water for the X-ray visualisation of the kidneys and urinary tract. (*Schering, London.*)

Uroselectan-B.—Di-sodium salt of 3 : 5-diiodo-4-pyridoxyl-N-methyl-2 : 6-dicarboxylic acid, containing 51 per cent. of iodine. It is administered by intravenous injection for the X-ray visualisation of the kidneys and urinary tract and is supplied in ampoules containing 20 millilitres of a solution of 15 grammes of the compound in 10 per cent. invert sugar solution. (*Schering, London.*)

Urotropine.—Brand of Hexamina. (*Schering, London.*)

Vagotonine.—Pancreatic hormone supplied in ampoules containing 0·02 gramme for subcutaneous injection in the treatment of arterial hypertension and paroxysmal tachycardia. (*Byla, Paris; Anglo-French Drug Co., London.*)

Validol.—Mixture of menthol and menthyl valerianate. (*Zimmer, Mannheim; Pharmaceutical Products, London.*)

Valisan.—Borneol ester of bromo*iso*valerianic acid. It is supplied in the form of perles for administration as a sedative and soporific in doses of 7½ grains. (*Schering, London.*)

Varixol.—Sterile preparation of quinine and urethane used for the same purposes as Injectio Quininæ et Urethani. (*Evans Sons Lescher and Webb, Liverpool.*)

Vasano.—Mixture of the camphoric acid salts of the alkaloids of mandragora root (*l*-scopolamine and *l*-hyoscyamine), administered in the prophylactic and curative treatment of all forms of travel sickness. (*Schering, London.*)

Veganin.—Combination of acetylsalicylic acid, 0·25 gramme, phenacetin, 0·25 gramme, and codeine phosphate, 0·01 gramme, in tablet form. It is used as an analgesic and sedative. (*Warner, London.*)

Ventræmon.—Brand of Ventriculus Desiccatus in powder or tablet form. (*Organon Laboratories, London.*)

Ventriculin.—Brand of Ventriculus Desiccatus. (*Parke Davis, London.*)

Veramon.—Mixture of barbitone in combination with amidopyrine, with excess of amidopyrine. It is administered in doses of 0·4 gramme (6 grains) for the relief of pain. (*Schering, London.*)

Veratrone.—Physiologically tested preparation of the active principles of *Veratrum viride.* It is administered hypodermically in doses of 0·5 millilitre (8 minims). It may also be given orally in doses of 1 to 2 millilitres (15 to 30 minims). (*Parke Davis, London.*)

Veronal.—Brand of Barbitonum. (*Bayer Products, London.*)

Veronal Sodium.—Brand of Barbitonum Solubile. (*Bayer Products, London.*)

Substances with Proprietary Trade-Names—*Continued.*

Veropyron.—Combination of barbitone, 0·15 gramme, and amidopyrine, 0·35 gramme, in tablet form. (*Richter, London.*)

Vesalvine.—Brand of Hexamina. (*Martindale, London.*)

Vesalvine B.—Hexamine benzoate. It is administered in the treatment of cystitis and in bacterial infections of the urinary tract in doses of 0·3 to 1 gramme (5 to 15 grains). (*Martindale, London.*)

Vesalvine S.—Hexamine salicylate. It is administered in the treatment of cystitis and in bacterial infections of the urinary tract in doses of 0·3 to 1 gramme (5 to 15 grains). (*Martindale, London.*)

Vigantol.—Solution similar to Liquor Ergosterolis Irradiati. (*Bayer Products, London.*)

Vioform.—Iodochlorhydroxyquinoline. It is used as an almost odourless substitute for iodoform. (*Ciba, London.*)

Viozin.—Ointment containing zinc oxide with Ostelin, equivalent to 5000 international units of vitamin D per gramme, in a lanolin and paraffin base. It is used for the local treatment of varicose ulcers, fistulæ, indolent ulcers and similar conditions. (*Glaxo Laboratories, London.*)

Vuzin.—Brand of Octylhydrocupreinæ Dihydrochloridum. (*Zimmer, Mannheim; Howards, Ilford.*)

Westron.—Brand of Tetrachlorethanum. (*Imperial Chemical Industries, London.*)

Westrosol.—Brand of Trichlorethylenum. (*Imperial Chemical Industries, London.*)

Xeroform.—Brand of Bismuthi Tribromphenas. (*Heyden, Dresden; Braun, London.*)

Yatren.—Iodohydroxyquinolinesulphonic acid mixed with sodium bicarbonate. It occurs as a yellow powder soluble in water. It is administered as an antiseptic, particularly in the treatment of amœbic dysentery, in doses of 1 gramme (15 grains) three times a day. It may also be administered by rectal injection of 200 millilitres of a 2 per cent. solution. (*Bayer Products, London.*)

Yatren-Casein.—Preparation of Yatren for non-specific therapy. It is administered by intramuscular injection and is supplied in two strengths; the weak solution contains in one millilitre 0·025 gramme of Yatren and 0·025 gramme of casein and the strong solution contains the same proportion of Yatren with 0·05 gramme of casein. (*Bayer Products, London.*)

Yohydrol.—Brand of Yohimbinæ Hydrochloridum. (*Riedel-de Haen, Berlin; Old Strand Chemical and Drug Co., London.*)

Zoin.—Water-soluble salt of an aminophosphorus compound occurring in casein. It is administered orally in solution or in the form of tablets in the treatment of neurasthenia and debility. (*Ciba, London.*)

Zymine.—Extract of pancreas containing various digestive enzymes. (*Fairchild, Bros. and Foster, New York; Burroughs Wellcome, London.*)

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609	18	*for*	0 2 to 0 6 gramme (3 to 10 grains)	*read*	0 06 to 0 2 gramme (1 to 3 grains)
629	36	*for*	50	*read*	20
671	22	*for*	159° to 168°	*read*	−159° to −168°
696	41	*for*	*l*-△-2 8-*p*-menthadiene	*read*	*l*-$\Delta^{2\ 8}$-*p*-menthadiene
731	20	*for*	**Compositus**	*read*	**Compositi**
746	7	*for*	△-3-carene	*read*	*d*-Δ^{3}-carene
874	37	*for*	Grave's	*read*	Graves'
912	32	*for*	**Scarlatine**	*read*	**Scarlatini**
931	39	*for*	Salutio	*read*	Solutio
963	30	*for*	0·003747	*read*	0 003746
980	32	*for*	0 0126	*read*	0 0252

[PTO]

page	*line*				
1013	31 and 32	*for*	the international standard	*read*	anhydrous
1058	35	*for*	$C_{20}H_{24}O_2I$	*read*	$C_{20}H_{24}O_2I_2$
1125	2	*for*	Hammamelin	*read*	Hamamelin
1145	1	*for*	fibre, dust	*read*	fibre-dust
1201	3	*after*	chloroform	*insert*	, the alcohol
1243	22	*for*	250 millilitres (5 fluid ounces)	*read*	200 millilitres (4 fluid ounces)
1270	5	*for*	**FLUORESCEINÆ**	*read*	**FLUORESCEINI**
1397	10	*for*	**Ferrous**	*read*	**Iron**
	12	*for*	Ferrous	*read*	Iron
1435	36	*for*	Exilir	*read*	Elixir
1524	33	*for*	131¼ g.	*read*	131¼ gr.
1543	43	*for*	X	*read*	Xe
1568	44	*for*	vesuvine bismarck brown	*read*	vesuvine (bismarck brown)
1569	35	*for*	100	*read*	1000
1629	41	*for*	Brand of Aethylis Salicylas	*read*	Ethyl ester of acetylsalicylic acid.
1640	35	*for*	3 : 4-Dihydroxyphenylmethylamine	*read*	3 : 4-Dihydroxyphenylethylmethylamine
1647	49	*for*	active	*read*	inactive
1658	39	*for*	Brand	*read*	Crystalline vitamin D. Radiostol Solution is a brand
1660	41	*for*	**Sionin**	*read*	**Sionon**
1709	11	*for*	495	*read*	485
1710	30	*for*	Fluoresceinæ	*read*	Fluoresceini
1713	59	*for*	645	*read*	1645
1746	59	*for*	Ferrous	*read*	Iron

May, 1936.

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